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To the Right Worſhipful

Sir SAMUEL CLARKE, *Knt.*

And Merchant of the Honourable

CITY of *LONDON.*

SIR,

WHEN I conſidered of your great Abilities, and moſt conſummate Knowledge, in Things of this Nature, I was under great Heſitations, leſt I ſhould appear too preſumptuous in dedicating ſuch a Trifle to your Worſhip: But then, Sir, again conſidering, that your Candour, and obliging Condeſcenſion, was equally as great; and alſo encouraged by Favours formerly received, I have ventured to ſhelter this *Treatiſe of Arithmetick*, under your great Name;

and if it gains but your Approbation, I ſhall not be ambitious of any other *Imprimatur*; but acquieſce with ſome Aſſurance, that the Book will meet with a favourable and kind Reception in the World. In this Impreſſion I have endeavoured to be as correct as poſſible, and have made large *Additions* and *Improvements* in the ſeveral *Rules*, which, with all humble Submiſſion, encourages me to hope it may in part excuſe for my Twelfth Preſumption in troubling your Worſhip: I remain, with all poſſible Reſpect and Deference,

Your Worſhip's

moſt Devoted,

and moſt Obedient

humble Servant,

GEO. FISHER.

THE

PREFACE.

Some time before I attempted, or had any Thoughts of compiling this Book, a very good Friend of mine, (Mr. *Wilkins*, *Ruſſia*-Merchant) deſired me to draw him out ſome few Notes of the ſhorteſt Ways and Methods of working ſome of the Rules in *Arithmetick*; which when I ſet about, endeavouring to oblige my Friend, I hit on ſeveral Things (not thought on by me before) which I hoped, if made publick, might be of good Service to the World.

If it be objected, That the Books on this Subject are too numerous already, I anſwer, That as many as there are extant, yet there are none ſo perfect, but there may be Improvements made upon them; and if ſo, and that theſe Improvements may be of any conſiderable Uſe and Benefit to Mankind, why may they not be made publick?

Arithmetick (ſaith Mr. *Locke*, in his *Eſſay on Human Underſtanding*) is of ſuch *general Uſe and Service*, in all the Parts of Life and Buſineſs, that ſcarce any thing is to be done without it; and therefore I think there cannot be too many, or too good Inſtructions for its Attainment: And before either *Hodder*'s, *Cocker*'s, or *Ayre*'s Books appeared in the World, there were many excellent Pieces of that Science then extant; and yet their Books came abroad, and found encouraging Entertainment, and they themſelves Applauſe, for their Endeavours.

And if another improves as much upon them, as they did upon others before them, why may he not hope for ſome Succeſs and Approbation? In ſhort, if the Book meets with Encouragement but equal to the Author's Care and Endeavours, to make it the moſt uſeful of its Kind, he will have Reward enough.

As to the Work, I have gone through *Numeration*, *Addition* (with ſeveral uſeful Tables), *Subtraction*, *Multiplication*, and *Diviſion*, with ſo much Plainneſs and Perſpicuity, and in ſuch familiar and pertinent Terms, that the meaneſt Capacity may underſtand them, and apply them properly.

In *Multiplication* I have been more copious than ordinary, that I might ſhew the excellent Uſes that may be made of that Rule only, particularly in *Money*; where by having the Price of one Thing, I have ſhewn how to find the Value of many Things at that Rate: So that if a Perſon well underſtands the Methods and Intentions of the Rules and Directions therein laid down, (which are as eaſy as *Addition of Money*) if he makes no farther Advances in *Arithmetick*, yet he ſhall be able to caſt up moſt Things that ordinarily occur in common Buſineſs, with Elegancy and Expedition.

In *Diviſion*, I have ſhewn the two *Italian* Ways of Dividing; and alſo ſeveral *Examples*, whereby a Sum many Times may be ſooner (and in much fewer Figures) worked at two Diviſions than at one: Likewiſe how Sums of divers Denominations, as of *Pounds*, *Shillings*, and *Pence*, &c. may be divided into equal Parts, without reducing them into the loweſt Name mentioned (as is generally the Practice) and is done in half the Time, and a Quarter of the Figures uſed in the other Way. Alſo by *Diviſion* to find, having the Value of many Things, the Price of one Thing at that Rate.

In *Reduction* I have ſhewn great Variety of Working, and divers Ways of abbreviating the common Method uſed in that Rule;

and how to bring *Groſs Weight* into *Pounds* without multiplying.

Next I ſhew the ſhorteſt and beſt Methods of deducting *Tare* and *Tret*, &c.

In the *Rule of Three* I have been very full in explaining its Nature and Uſe; with two ſeveral Methods of ſhortening moſt Operations in that Rule, as is clearly evinced by ſundry Examples therein.

From thence I paſs to the *Rule Inverſe*, and exemplify it by Variety of *Rules* and *Examples*: As alſo the *Double Rule of Three Direct* and *Inverſe*; with the *Rule of Three*, compoſed of the Five given Numbers.

Then the ſeveral *Rules of Practice* are taught with greater Variety and Improvements than in any one Book of *Arithmetick* hitherto extant.

As alſo the *Rule of Company*, with a Method of contracting the tedious Way of working Queſtions in that Rule.

Likewiſe *Intereſt* at all Rates, ſhewn in ſundry *Examples* variouſly wrought. With *Diſcount*, *Exchange*, *Profit* and *Loſs*.

Then I treat of *Fractions* both *Vulgar* and *Decimal*, working one with the other, in ſuch a Method as renders both eaſy to be underſtood: And in ſuch familiar Terms as explain their Nature and Uſe.

I have now with the utmoſt Care, Diligence and Probity, endeavoured to make this Piece of *Arithmetick* the moſt uſeful of its Kind, (conſidering its Bulk and Value) that is at preſent extant: Here is nothing abſtruſe or myſterious, but all plain and eaſy; and nothing but what will bear an intelligible Demonſtration.

I have gone through the whole Book, Line by Line, and have taken all due Care to correct what was amiſs in the other Impreſſion; and as there was no other Hand in the Reviſal made uſe of but my own, I can with greater Aſſurance affirm, and with the more Confidence aſſert, that the Book is now entirely correct: And the *Additions* which are very numerous and conſiderable, (almoſt in every Rule) are new, ſhort, and very conciſe in Operation; and pertinently interſperſed thro' the whole, as I had opportunity, and ſaw occaſion.

If there ſhould by chance be a Tranſpoſition of a Letter, (tho' there hath been great Care taken of that alſo) or by a greater Chance, a falſe Figure or Cypher, or a miſplaced one, I hope, nay, I doubt not, but truly judicious, and candidly ingenious Readers will excuſe me for them; for tho' all may take care, yet there's none infallible. But I can with a modeſt Boldneſs aſſure them, there is no occaſion for an *Errata* Page, which may diſcourage them at the Beginning, or cool them at the latter End of the Book.

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THE

CONTENTS.

CHAP. I. *Of* Numeration, *with various Examples and Methods of Reading and Writing Numbers.*

II. Addition of whole Numbers, *comprehending that of Money, Weight, Meaſure,* &c. *with very uſeful and neceſſary Tables to each Rule.*

III. Subtraction of whole Numbers, *in Money, Weight, and Meaſure, with pertinent and familiar Examples for the full and eaſier underſtanding its Nature and Uſe.*

IV. Multiplication of whole Numbers, *with great Variety in the ſeveral Ways of working that Rule; and alſo new Methods to render it as uſeful in Buſineſs, as if the Learner underſtood the* Rule of Three *and* Practice.

V. Diviſion of whole Numbers, *with new Improvements, and how to make it anſwer many Queſtions that ſeem to require the* Rule of Three *for their Solution.*

VI. Reduction of *Money, Weight, and Meaſure, with ſundry Examples of Improvement, and contracting ſeveral Things in that Rule; with a Method of reducing* Groſs Weight *into* Pounds, *without Multiplication.*

VII. *Of* Tare *and* Tret, *&c. with great Variety in deducting them in the general and particular Way of Buſineſs.*

VIII. The Single Rule of Three Direct, *with great Improvements, and two Methods of contracting moſt Queſtions in that Rule.*

IX. The Single Rule of Three Inverſe, *explain'd, improv'd, and taught by ſundry and various Examples.*

X. The Double Rule of Three Direct, *with great Variety; and how to work any Queſtion therein, by a Rule compoſed of the Five given Numbers.*

CONTENTS.

XI. The Double Rule of Three Inverſe, *as alſo how to perform any Queſtion in that Rule, by a Rule of five Numbers.*

XII. Rules of Practice, *with greater Variety and Brevity than is in any Book extant.*

XIII. The Rule of Company, *or* Partnerſhip, *with or without Time ; as alſo how to contract the tedious and common Methods of working Queſtions in that Rule.*

XIV. Barter, *with the divers Methods of exchanging one Sort of Goods for another.*

XV. Intereſt, *with ſeveral Examples variouſly wrought, as alſo ſeveral other uſeful Things worked by the ſame Method, that do not come under the Denomination of Ineereſt ; as* Proviſion, Average, *&c.*

XVI. Diſcount, *with ſundry Examples and Methods of Operation.*

XVII. Exchange *in various Examples ; with Tables of the ſeveral Species of Foreign Money, and their* Engliſh *Value, &c.*

XVIII. Profit and Loſs, *with facile and conciſe Methods of finding the Gain or Loſs, on any Commodity either in the Whole, or at ſo much* per Cent.

XIX. Fractions Vulgar and Decimal, *worked together in ſuch intelligible Order, that the meaneſt Capacity may underſtand the Nature and Uſe of both. Alſo,* The Rule of Three in Fractions, *Vulgar and Decimal, and ſome practical Examples of Intereſt wrought decimally,* &c.

ARITHMETICK

WITH

NEW IMPROVEMENTS,

In the Plaineſt *and* moſt Conciſe, METHODS *hitherto extant*.

CHAP. I.

ARITHMETICK is the Art of caſting Accompts by Number, and hath theſe Five Parts, *viz.* NUMERATION, ADDITION, SUBTRACTION, MULTIPLICATION, and DIVISION, which ought thoroughly to be known and underſtood; for by theſe Rules only the whole Art is attainable, all other being wrought by them.

Of NUMERATION.

NUMERATION teaches to read or write any Sum or Number, known or propoſed.

To which End obſerve, that all Numbers whatſoever, are expreſs'd by, or compoſed of, theſe Ten Figures or Characters, *viz.*

One, Two, Three, Four, Five, Six,
1 2 3 4 5 6
Seven, Eight, Nine, Cypher.
7 8 9 0

The firſt Nine of theſe are called Significant Figures, to diſtinguiſh them from the 0, or Cypher, which of itſelf is inſignificant, and therefore, by ſome, is called a Nought; but it ſerveth to increaſe or decreaſe the Value of other Figures, according as it is placed.

Every one of the nine Digits hath two Values; the one certain by its Form; and the other uncertain by its Place.

The Value of a Figure may be ſaid to be certain when it ſtands alone, without any Figure or Cypher annexed to it, or, if it ſtands in the firſt Place or Place of Units, in a Number; for then it never ſignifies any more than its own Value; as 2 is but Two, 6 but Six.

The Value of a Figure may be ſaid to be uncertain with reſpect to the Place it is found in: So any of the Nine Figures in the Place of Units, ſignifies but its ſimple Value (as was ſaid before) but in the ſecond Place it is to be accounted ſo many Tens, as it contains Units. As 5, in the firſt Place, is but Five; but in the ſecond Place it ſignifies ſo many Tens, or Fifty, So that 5 may ſignify Five, or Fifty, or five Hundred, or five Thouſand; and 7 may ſignify Seven, or Seventy, or ſeven hundred Thouſand, *&c.*

So every Figure is encreaſed in Value, by a tenfold Proportion, from the Right Hand to the Left. As, in the firſt Place, it is ſo many Units, or Ones; in the ſecond Place, ſo many Tens; in the third Place, ſo many Hundreds; in the fourth, ſo many Thouſands; in the fifth, ſo many Ten thouſands; in the ſixth, ſo many Hundred Thouſands; in the ſeventh, ſo many Millions, *&c.*

Admit this Number for Explanation, *viz.* 1234567, the 7 is only ſeven Units, or Seven; but 6 in the ſecond Place, is ſix times Ten, or Sixty; the 5 in the third Place, an Hundred Times Five, or five Hundred; the 4 in the fourth Place, a thouſand times Four, or four Thouſand; the 3, three times ten Thouſand, or thirty Thouſand; the 2, in the ſixth Place, two hundred Thouſand; and 1, in the ſeventh Place, one Million. Thus the Order of Places is accounted from the Right Hand to the Left, but to be read from the Left Hand to the Right, thus: one Million, two Hundred, thirty-four Thouſand, five Hundred, Sixty-Seven.

If any Figure hath a Cypher or Cyphers, joined to it, it will ſtill retain the Value of its Place, as much as if joined with any other Figure, or Figures, in the Room of the Cypher, or Cyphers. So if to the Figure 5, there be annexed a Cypher thus (50) its Value is five Tens, or fifty; becauſe it ſtands in the ſecond Place, or Place of Tens. Or if it have two Cyphers joined with it thus, (500) its Value is five Hundred; becauſe it poſſeſſeth the Place of Hundreds, or third Place, *&c.*

For the eaſier underſtanding the foregoing Directions, and better reading any Number, obſerve the following *TABLE.*

The NUMERATION TABLE.

	Hundreds of Millions.	Tens of Millions.	Millions.	Hundreds of Thouſands.	Tens of Thouſands.	Thouſands.	Hundreds.	Tens.	Units.			
Places.	9	8	7	6	5	4	3	2	1	Milli.	Thouſ.	Unit.
	9	8	7	6	5	4	3	2	1	987	654	321
		9	8	7	6	5	4	3	2	98	765	432
			9	8	7	6	5	4	3	9	876	543
				9	8	7	6	5	4		987	654
					9	8	7	6	5		98	765
						9	8	7	6		9	876
							9	8	7			987
								9	8			98
									9			9

The firſt Thing to be done, is to get by Heart the Value of the ſeveral Places, with their Number, at the Head of the Table, *viz.* Units, Tens, Hundreds, Thouſands, *&c.* which being well underſtood, the Learner may thereby be capable of reading or writing any Number propoſed.

And for the eaſier reading of the Numbers in the Table, they are, on the Right Hand, ſet by Periods; and over them, the Names of Units, Thouſands, and Millions, and to be read thus; 987 Millions, 654 Thouſands, 321. The next Line, 98 Millions, 765 Thouſands, 432. And the next, 9 Millions, 876 Thouſands, 543, *&c.*

Though this Table conſiſts of but nine Places, yet it might have been extended to twelve, fourteen, or more Places, at Pleaſure. As after hundreds of Millions, Thouſands of Millions; ten Thouſands of Millions, hundred Thouſands of Millions; then Millions of Millions, *&c.*

As, admit this Number of thirteen Places, *viz.* 1234567890123; for the eaſier reading of which, or any other Number, make a Point under or over every third Figure, beginning at the Right, thus:

$$\underset{\cdot}{1}\quad \underset{\cdot}{2}34\quad \underset{\cdot}{5}67\quad \underset{\cdot}{8}90\quad \underset{\cdot}{1}23$$

So that the firſt Point is under 1, and the laſt under 2, towards the Left Hand; and you are to account every third Place, or Period Hundreds, and to read it thus; 1 Million of Millions, 234 Thouſands, 567 Millions, 890 Thouſand, 123.

QUESTIONS.

1 *What is 5 in the fiſth Place?*

Anſw. By annexing four Cyphers on the Right Hand thus, 50000; it is fifty Thouſand.

2 *What is the 7 in the ſeventh Place?*

Anſw. By putting ſix Cyphers on the Right Hand thus, 7000000; it is ſeven Millions.

3 *How do you ſet down Eleven Thouſand, Eleven Hundred and Eleven?*

Anſw. Thus 12111 { 11000, Eleven Thouſand.
1100, Eleven Hundred.
11, Eleven.
Proved by *Addition* { 12111. *Proof.*

14 *How do you write Fourteen Thouſand, Fourteen Hundred and Fourteen?*

Anſw. Thus, 15414 { 14000, Fourteen Thouſand.
1400, Fourteen Hundred.
14, Fourteen.

Proved by *Addition* 15414 *Proof.*

NUMBERS.

707,	Seven Hundred and Seven.
4006,	Four Thouſands and Six.
60606,	Sixty Thouſands, ſix Hundred and Six.
100004,	One Hundred Thouſand and Four.
7770405,	Seven Millions, 770 Thouſands 405.
500007,	Five Hundred Thouſands and Seven.
111111,	One Hundred Eleven Thouſand, 111.
999999,	A Million wanting One.
400400400,	Four Hundred Millions, 400 Thouſ. 400.
100000000,	Ten Thouſand Times Ten Thouſand, or, One Hundred Millions, *Revel.* v. 11.
200000000,	Two Hundred Thouſand Thouſand, or, Two Hundred Millions, *Revel.* ix. 16.
2070040500,	Two Thouſand and Seventy Millions, Forty Thouſand Five Hundred.

A Table of Old Roman *Numbers.*

100	C.	2000	CIↃ. CIↃ. or, M. M.
200	CC.	3000	CIↃ.CIↃ.CIↃ. or, M.M.M.
300	CCC.	5000	IↃↃ.
400	CCCC.	10000	CCIↃↃ.
500	D or IↃ.	50000	IↃↃↃ.
600	DC	100000	CCCIↃↃↃ. or CM.
700	DCC.	500000	IↃↃↃↃ.
800	DCCC.	1000000	CCCCIↃↃↃↃ.
900	DCCCC.	1666	MDCLXVI.
1000	M. or, CIↃ.	1718	MDCCXVIII. or, CIↃ. IↃCCXVIII.

CHAP.

CHAP. II.

Of ADDITION.

ADDITION is the putting two or more Numbers or Sums together, and thereby bringing them into one Total Sum.

And is of one Denomination, or ſeveral.

Addition of one Denomination is, when the Numbers or ſeveral Articles are all of one Name; that is, all Pounds, Gallons, Ells, Miles, Sheep, &c.

Addition of ſeveral Denominations is, when the ſeveral Lines, conſiſt of divers Names, as *Pounds, Shillings*, and *Pence*; *Hundreds, Quarters*, and *Pounds*; or *Yards, Quarters*, and *Nails*, &c.

Numbers to be added together, muſt be placed in ſuch Order under one another, (it matters not which is uppermoſt, the greateſt or leaſt Numbers) that Units may ſtand under Units; Tens under Tens; Hundreds under Hundreds; Thouſands under Thouſands, &c.

As if you were to add 122 Feet, 44 Feet, and 33 Feet together, they muſt be ſet down one under the other as follows, *viz.*

Feet.		*Feet.*
122	Or thus	33
44		44
33		122

Having placed the Numbers to be added as above, draw a Line under them, and begin at the loweſt Figure on the Right Hand, being the Place of Units, ſaying, 2 and 4 is 6 and 3 is 9, which put directly under the Line, and juſt under its own Rank, *viz.* under 2 and 4 and 3; and then go to the next Row towards the Left

Hand, ſaying, 3 and 4 is 7, and 2 is 9; which alſo ſet down under the Line, juſt under its own proper Rank, *viz* under 3, 4, and 2; then go to the laſt Row, where you find but 1, which you muſt put down alſo under the Line juſt under itſelf; and ſo the Numbers are added together; and you will find that they make 199 Feet in all, as by the *Example* ſollowing.

Hundreds.	*Tens.*	*Units.*		*Hundreds.*	*Tens.*	*Units.*	
1	2	2			3	3	
	4	4			4	4	
	3	3		1	2	2	
1	9	9		1	9	9	*Feet in all.*

When any of the Ranks amount to Ten or Tens, or they exceed Ten or Tens, then you muſt place a Cypher under the Line in its proper Place; or elſe, what is above Ten, or Tens; and for every Ten carry an Unit, or One, to be added to the next Rank. *As for Example:* If the Series or Row, amount juſt to Ten, I ſet down a Cypher under the Line in its Place, (for every Figure or Cypher muſt be ſure to ſtand juſt under its own Rank) and carry one to the next Rank for the one Ten. So if any of the Rows come juſt to even Tens, as 20, 30, 40, *&c.* I ſet down a Cypher, and carry either two, three or four, according to the Number of Tens. And when it happens, that any of the Ranks exceed Ten, or Tens, then whatever the Exceſs is, ſet it down under the Line in its Place. As if it amounts to 45, ſet down 5, and carry 4, for the four Tens, to the next Row. If to 72, ſet down 2, and carry 7, for the ſeven Tens, *&c.* And when you come to the laſt Row, ſet down what it amounts to, let it be what it will. *Examples* follow, exemplifying the Directions above.

Add 26*l.* 15*l.* 20*l.* and 45*l.* together. Alſo 265 Ells, 354 Ells, 460 Ells, 375 Ells, and 246 Ells together; which muſt be ſet down as underneath.

Pounds.	*Ells.*
26	265
15	354
20	460
45	375
	246
106	1700

Beginning at the lowermoſt Figure in the Place of Units, ſay, 5 and 5 is 10, and 6 is 16, which is 6 over one Ten, wherefore ſet down 6 under its own Rank, and carry 1 for the Ten to the next Rank, ſaying, 1 that you carry, and 4 is 5, and 2 is 7, and 1 is 8, and 2 is 10, which being the laſt Row ſet down 10, and the Work is done; and the *Total* of the four Numbers is 106*l.* As in the *Example.*

So, in the next *Example*, begin with the bottom Figure on the Right Hand, and ſay 6 and 5 is 11, and 4 is 15, and 5 is 20; which being juſt two Tens, and nothing over, ſet down a 0, and carry 2 to the next Rank, for the 2 Tens, and ſay, 2 that you carry, and 4 is 6, and 7 is 13, and 6 is 19, and 5 is 24, and 6 is 30; which amounting juſt to 3 Tens, ſet down a 0 again, and carry 3 for the 3 Tens, ſaying, 3 that you carry, and 2 is 5, and 3 is 8, and 4 is 12, and 3 is 15, and 2 is 17, which being the laſt Row, ſet down 17, and the total Sum is 1700 Ells; as may be ſeen in the *Example.*

The Reaſon for carrying One for every Ten to the Left Hand is, becauſe the Increaſe of every Place that Way, is by a tenfold Proportion, as was ſaid in *Numeration.*

Examples for Practice.

Yards.		*Gallons.*	*Pounds.*
74		74	746
09		9	379
72	Or thus	72	024
19		19	100
07		7	074
70		70	047
251		251	1370

Some chooſe to omit the Cyphers on the Left Hand, as in the ſecond *Example*; thinking it a little too preciſe, ſince Cyphers on the Left Hand ſignify nothing; but the other is beſt for a Learner, for his better underſtanding the Value of the Places, &c.

More Examples.

l.	*Ells.*	.
71	742	7444
17	371	270
46	460	5000
64	072	500
20	971	6742
2	674	240
56	324	52
65	05	9
341	3619	20257

Here follow ſome familiar *Examples*, ſhewing the Nature and Uſe of this Rule, *viz.*

Queſtion 1. Between *London* and *Royſton* are 33 Miles from thence to *Cambridge* 10; thence to *New-market* 10; thence to *Bury* 10; thence to *Thetford* 10; thence to *Attleborough* 10; and from thence to *Norwich* 12 Miles: How many Miles are there between *London* and *Norwich*?

Miles.

Set down the Numbers thus.
33
10
10
10
10
10
12

Between *London* and *Norwich* are 95 Miles.

Queſtion 2. Again how many Days are there in theſe 12 Calendar Months, or a Year?

	Days.
January hath	31
February	28
March	31
April	30
May	31
June	30
July	31
Auguſt	31
September	30
October	31
November	30
December	31

Anſwer, 365 Days.

Queſtion. 3. Suppoſe a Farm contains theſe Acres in the ſeveral Fields following, *viz.*

In

	Acres.
In one Field	10
Another	15
Another	12
Another	20
Another	9
Another	6
And in another	22
How many Acres in all?	94 Anſwer.

Queſtion 4. Admit a *Draper* meaſures 10 Pieces of Cloth, and their Contents are, *viz.*

No.	*Yards.*
1 *qt.*	35
2	12
3	25
4	10
5	9
6	16
7	10
8	20
9	15
10	8
Anſwer,	160 Yards

How many yards in all?

Note, *That in ſetting down the Numbers, Care muſt be taken, not to place Units under the Place of Tens, but to put them properly, as in the* 5th *and laſt Article of the ſum above.*

Queſtion 5. A *Corn Factor* bought as follows, *viz.*

	qrs.
Wheat — — —	56
Oats — — —	45
Peas — — —	24
Rye — — —	72
Barley — — —	220
	417 *Quarters in all.*

Queſtion 6. A Ship from the *Indies*, whoſe Cargo is as follows, *viz.*

		l.
In	*Pepper* — — — —	14280
	Other Spices — — —	9741
	Diamonds — — — —	112579
	Callicoes — — — — —	47217
	Muſlins — — = —	74219
	Drugs — — — — —	11241

What is the Value of the whole? *l.* 269277 *Anſw.*

Queſtion 7. What Number is that, from which, if you ſubſtract 18, the Remainder will be 24?

Anſw. 42. *For if you add* 18 *and* 24 *together they make* 42, *the Number ſought.*

To prove ADDITION.

Begin at the Top, and caſt it downwards, in the ſame Manner as you did upwards; and if the Figures, or Cyphers of the Total, prove the ſame as in caſting upwards, the Work is right; otherwiſe they muſt be caſt upwards and downwards, till they do agree.

AD-

ADDITION of MONEY.

In *Addition* of ſeveral Denominations muſt be obſerved, how many of the ſmaller Name make one of the next *greater:* As how many *Farthings* make a *Penny*; how many *Pence* a *Shilling*; and how many *Shillings* a *Pound*. Therefore I ſhall place the ſeveral *Tables of Money*, *Weight*, *Meaſure*, &c. before the *Examples*, they being neceſſary to be firſt known.

Note, 4 *Farthings* make one *Penny*, 12 *Pence* one *Shilling*, and 20 *Shillings* one *Pound*.

In a Pound *Sterling*, are { 20 *Shillings*.
240 *Pence*.
960 *Farthings*.

Note alſo, That in Addition of *Engliſh* Money, *l.* ſtands for *Pounds*; *s.* for *Shillings*; *d.* for *Pence*; *qr.* for *Farthings*; becauſe *Libra* ſignifies a *Pound*; *Solidus* a *Shilling*; *Denarius* a *Penny*; and *Quadrans* a *Farthing*.

But the beſt Way to ſet down *Farthings*, or Parts of a *Penny*, is:

$\frac{1}{4}$	A *Farthing*, or Quarter of a Penny.
$\frac{1}{2}$	A *Half-penny*, Half a Penny.
$\frac{3}{4}$	*Three-Farthings*, Three Quarters of a Penny.

Example 1.

Suppoſe I owe one Perſon, 5*l.* 4*s.* 6*d.* to another, 7. 11. 9. to another 4. 07. 5. to another 7. 08. 4. to another, 8. 00. 0. and to another, 9. 07. 6. How much do I owe in all to theſe ſeveral Perſons? To do this, theſe ſeveral Sums muſt be ſet down in ſuch Order, that *Pounds* may ſtand under *Pounds*, *Shillings* under *Shillings*, and *Pence* under *Pence*; with Points, or Strokes of Separation between them, as follows.

In

l.	*s.*	*d.*
5	04	6
7	11	9
4	07	5
7	08	4
8	00	0
9	07	6

In caſting up this and all other Sums in this Rule, you muſt remember, That for every 4 in the *Farthings*, you muſt carry 1 to the Pence, becauſe 4 *Farthings* make a Penny; for every 12 in the Pence, you muſt carry 1 to the Shillings, becauſe 12 Pence make a Shilling; and for every 20 in the Shillings, you muſt carry 1 to the Pounds, becauſe 20 Shillings make a Pound; and the Pounds muſt be caſt up as Sums of one Denomination, for every 10, carrying one to the next Row. And in all Additions, whether of *Money*, *Weight*, or *Meaſure*, &c. that Denomination towards the Left Hand (which is the firſt ſetting down, but the laſt in caſting up) muſt be ſo caſt up.

The ſame being again ſet down with a Line drawn under it, appears thus:

l.	*s.*	*d.*
5	04	6
7	11	9
4	07	5
7	08	4
8	00	0
9	07	6
41	19	6

I begin at the ſmalleſt Denomination towards the Right Hand, (as in all *Additions* we muſt, whether of *Money*, *Weight*, or *Meaſure*) to wit, *Pence*, and ſay, 6 and 4 is 10, and 5 is 15, and 9 is 24, and 6 is 30, now 30 Pence is 2 Shillings and 6 Pence, wherefore I put down the 6 Pence under its own Rank, and carry 2 for the two

Shillings to the Rank of Shillings, ſaying, 2 that I carry, and 7 is 9, and 8 is 17, and 7 is 24, and 11 is 35, and 4 is 39: Now 39 Shillings is 1 Pound 19 Shillings; wherefore I ſet down the 19*s.* under its own Rank, and carry the 1 Pound to the Pounds, ſaying, 1 that I carry, and 9 is 10, and 8 is 18, and 7 is 25, and 4 is 29, and 7 is 36, and 5 is 41; which being placed under the title of Pounds, is forty one Pounds; ſo the whole Sum is, 41*l.* 19*s.* 6*d.* as in the *Example* may be ſeen.

Addition of ſeveral Denominations, is proved in the ſame manner as *Addition* of One by caſting it downwards; and if it agrees with the Sum when caſt upwards, it is right.

There is another Way uſed in Schools; that is to caſt up again, except the upper Line, and then that Total they add to the upper Line, and if it agree with the Sum firſt found, it is right. But this Way is not ſo practical in Matters of real Buſineſs; therefore I prefer the other before it.

For the readier Diſpatch in caſting up the Pence, 'tis very neceſſary to have the following Tables by heart.

Pence.		*s.*	*d.*		*Shil.*		*Pence.*
20		1	8		1		12
30		2	6		2		24
40		3	4		3		36
50		4	2		4		48
60		5	0		5		60
70	is	5	10	Or, 12 times	6	is	72
80		6	8		7		84
90		7	6		8		96
100		8	4		9		108
110		9	2		10		120
120		10	0		12		144

Get theſe Tables by heart, thus; 20*d.* is 1*s.* 8*d.* 30*d.* is 2*s.* 6*d.* &c.

Example

Example 2.

Bought by a Country *Shop-keeper* in *London*. viz.

	l.	*s.*	*d.*
Linnen Cloth, to the Value of	21	11	4
Sugars,	7	10	0
Tobacco's	16	14	2
Woollen Cloths, and Stuffs,	37	10	0
Fruit,	11	16	8
Brandy, and Waters,	9	14	2
	104	16	4

How much did he lay out in all?

Beginning at the Pence, I ſay, 2 and 8 is 10, and 2 is 12, and 4 is 16; and 16*d* is 1*s.* 4*d.* I ſet down the 4, and carry the Shilling to the next, the Place of Shillings, ſaying, 1 that I carry, and 4 is 5, (for I omit the Tens of Shillings till I come to the Top) and 6 is 11, and 4 is 15, and 1 is 16; then I come downwards with the Tens, ſaying, 16 and 10 is 26, and 10 is 36, and 10 is 46, and 10 is 56, and 10 is 66, and 10 is 76 Shillings, which is 3*l.* 16*s.* I ſet down the 16 under the Place of Shillings, and carry the 3 Pounds to the Pounds, ſaying, 3 and 9 is 12, and 1 is 13, (for I go up but with one Row at a time) and 7 is 20, and 6 is 26, and 7 is 33, and 1 is 34; I ſet down 4, and carry 3 for the 3 Tens (for the laſt Denomination muſt be caſt up as Sums of one Denomination, for every 10 carrying 1, as we ſaid before) and ſay, 3 that I carry, and 1 is 4, and 3 is 7, and 1 is 8, and 2 is 10; which being the laſt Row, I ſet it down. So the whole Sum is, 104*l.* 16*s.* 4*d.* as *per* the Work.

Example

Example 3.

A *Merchant* upon the ballancing of his Books, finds he has in Money, Debts, and Goods, *viz.*

	l.	*s.*	*d.*
In Caſh,	2000	00	0
In Cambricks,	60	00	0
In Tobacco's	47	16	6
By *Henry Harper,* owing	121	17	4
In Sugar,	246	07	2
In Serges,	70	11	0
By Voyage to *Lisbon,*	724	06	7
In Indigo,	370	12	0
By *William Waxham,*	1000	00	0
In Cochineal,	424	16	0
By the Ship *Roſe,*	640	11	8
In *Canary* Wine,	142	17	0
	5849	15	3

Example 4.

A *Brewer's Clerk* receives of ſeveral Perſons as follows, *viz.*

		l.	*s.*	*d.*
Of	*Lawrence Lick Spiggot,*	12	14	4
	Frank Froth,	9	10	6
	Sam. Swigg	20	11	0
	Ben. Bumper,	36	16	8
	Henry Here'st'ye,	24	00	0
	Stephen Stout,	8	16	6
	Receiv'd in all,	112	09	0

Exampl

Example 5.

A Collector of *Exciſe* receives in

	l.	*s.*	*d.*
Suſſex,	1420	10	6
Kent,	974	11	2
Surry,	641	17	4
Hampſhire,	1344	11	1
Hertfordſhire,	741	17	4
Bucks,	617	10	0
Total,	5740	17	5

Example 6.

Sold by a *Hoſier,*	*l.*	*s.*	*d.*	*q.*
4 *pr.* Silk Stockings, at	2	10	6	½
7 *pr.* Worſted *ditto, at*	1	15	2	¼
9 *pr.* of Thread Hoſe, at	0	18	3	¾
12 *pr.* of Children's at	2	07	6	½
3 *Yrds.* of Flannel, at	0	02	7	¼
6 *pr.* of mill'd Hoſe, at	1	06	5	¾
In all,	9	0	8	

Here I begin with the Farthings, ſaying, 3 and 1 is 4, and 2 is 6, and 3 is 9, and 1 is 10, and 2 is 12, which is Three-pence; which I carry to the Pence &c.

Sometimes Sums are *expreſſed* one Way, and *ſet down* another, *viz.*

Example 7.

	Expreſs'd	*Set down*		
For	Coals, *Six and Thirty Shillings,* —	1	16	0
	Cloth, *Seven and Fifty Shilliags,* —	2	17	0
	Sum,	4	13	0

Example 8.

	l.	*s.*	*d.*
A Guinea, ———	1	01	0
A Merk, ——— ———	0	13	4
An Angel, ——— —	0	10	0
A Noble — — —	0	06	8
A Crown, ——— ———	0	05	0
A Half-Crown, ——— —	0	02	6
Total,	2	17	6

Example 9.

Expreſs'd	*Set down*		
	s.	*d.*	*q.*
Mutton *Eight Groats,* ——— ———	2	8	
Onions, *Seven Farthings,* ———	0	1	¾
Tobacco *Two and Twenty Pence,* — —	1	10	
Wine, *Fifteen pence,* — — — —	1	3	
Thread *Three Half-Pence,* — — —		1	½
Soap, *Nineteen pence,* — — —	1	7	
Veal, *Eleven Groats and Two Pence,* —	3	10	
Sum,	11	5	¼

Tho' when ſome of theſe Sums are to ſtand alone, and not in Order of *Pounds*, *Shillings*, and *Pence*; as in a Letter, *&c.* 'tis better to ſet them down as ſpoken: As 15*d.* 45*s.* &c. rather than 1*s.* 3*d.* or 2*l.* 5*s.*

Note, *That in ſetting down your Sums Care muſt be taken, that you do not ſet down more, or ſo much in the Place of a leſſer Denomination, than makes one of the next greater; for 'twould be abſurd to write down* 18l. 22s. 15d. *for* 19l. 03s. 3d. Or, 15C 3q. 29lb. for 16C. 0q. 1lb.

Some uſed formerly (and ſome of weak Heads do now) to make a *Point* or *Stop*, at every 4 in the Farthings; at every 12 in the Pence; at every 20 in the Shillings; and at every 10 in the Pounds; if they conſiſt of ſeveral Ranks, carrying ſo many Ones, as they find Points or Specks in one Denomination, to the next: But this Way is both tedious and ſlovenly. But if your Sums are very large you may make a Stop, at every 60, in the Pence, for 5*s.* and carry accordingly to the Shillings; and for the Units Rank in Shillings, caſt them up as Sums of one Denomination for every Ten carrying One to the Tens of Shillings, and reckon them as ſo many Ones; and when you come to the Top, halve them, which half carry to the Pounds; but if they halve not even, ſet down the odd One, in the Ten's Place of Shillings, *&c. Examples* of which, you will find in the following Page.

Whenever there is a Neceſſity to *point* or *ſtop*, do it rather upon your Nail, or on a bit of Paper, than in your Book or Paper, where the Sum is; becauſe in proving it, the Points very rarely happen in the ſame Place; and the many *Stops* may be apt to confound you, and alſo make the Work appear foul.

Example 10.

l.	*s.*	*d.*
46	17*	10
17	11	6,
74	06	9
54	19	7
45	09	8
72	14	5
27	04	3
16	07*	9
61	17	8
24	06	7,
42	17	5
24	19	7
47	11	5
74	01	9
41	00	7
36	17	5
47	17	9
20	10	11
777	12	10

Example 11.

l.	*s.*	*d.*
714	19	6
412	10	7
374	11	9
241	14	5
474	16	4
372	12	6
330	12	9
200	07*	9
472	12	7
521	09	6
245	17	8
324	12	2
725	15	4
317	13	9
972	14	5
321	15	7
733	17	3
245	11	1
8004	04	11

Here, in the 10*th* *Example*, I begin at the Bottom, ſaying thus, 11 and 9 is 20 &c. till I come to the Article 24*l.* 6*s.* 7*d.* where the Figures amount to 65, there I make a *Point* or *Stop*, for 5*s.* and carry 5 to the next Figure over it, ſaying, 5 and 8 is 13, &c. till I come to the Article 17*l.* 11*s.* 6*d.* where it amounts to juſt 60; and there I make another *Point* for 5*s.* more; and for the odd 10*d.* I ſet it down in its Place, and carry the two 5*s.* making 10, to the Shillings, ſaying, 10 and 7 is 17, and 7 is 24, &c. till I come to the Top, there it amounts to 102; wherefore I ſet down 2, and carry 10 to the Tens of *Shillings*; ſaying 10 and 1 is 11, &c.

And at the Top it comes to 21, the Half of which is 10, and 1 over, which I place on the Left Hand of the 2. and it makes 12*s.* and I carry the 10 to the Pounds, ſaying, 10 and 7 is 17, and 6 is 23, *&c.* caſting the *Pounds* up as Sums of one Denomination; and the Total is 777*l.* 12*s.* 10*d.* As in the *Example* may be ſeen.

Or the *Shillings* may be caſt up by *Pointing* at every 60, and 40, in the Unit Rank of *Shillings*, which make 5*l.* As at the Articles, *l.* 16 07* 9 and *l.* 46 17* 10 or uppermoſt Number, where a ſmall *Aſteriſm* is placed to denote it accordingly. At the Top it comes to 42: I ſet down 2, and carry 5*l.* to the Tens of *Shillings*, taking two of them as I go up, for 1*l.* ſaying, 5 I carry and 1 is 6, and 1 is 7, *&c.*

AVOIRDUPOIS-WEIGHT.

By this Weight is weighed all Kind of *Grocery* Wares; or Goods ſubject to Waſte; as *Tobacco, Sugar, Fruit, Drugs, Butter, Cheeſe, Allom, Iron, Braſs, Lead, Soap, Tallow, Pitch, Rozin, Tin, Salt, Wax, Flax, Hemp,* and all kind of Garble Goods, *&c.*

A *Table of* Avoirdupois Weight.

16 Drams	make	1 Ounce	*oz.*
16 Ounces		1 Pound	lb.
28 Pounds		1 Quarter of a Hundred	*qr.*
4 Quarters		1 Hundred	*C.*
20 Hundred		1 Tun.	*T.*

Note, *A Pound* Avoirdupois Weight *is equal to* 14 *Ounces,* 12 *Penny Weight* Troy.

In a Tun Weight, are
573440 *Drams.*
35840 *Ounces.*
2240 *Pounds.*
80 *Quarters.*
20 *Hundreds weight of* 112lb. *each.*

AVOIRDUPOIS *Great Weight.*

Examples.

(10) *Tuns*	(20) *C.*	(4) *qr.*	(28) lb.
7	14	3	12
5	19	1	06
9	07	1	00
7	07	2	12
2	15	0	20
9	17	3	21
43	02	0	15

(10) *Tuns*	(20) *C.*	(4) *qr.*	(28) lb.
7	11	1	12
6	07	2	15
7	09	1	17
4	15	1	16
6	07	1	14
2	17	0	19
35	08	1	9

Here you muſt begin at the leaſt Denomination towards the Right Hand (as before in Money) *viz.* Pounds; ſaying, 21 and 10 is 31, (taking but one 10 in the 20, for the eaſier reckoning) which is 3 above 28; make a *Point* on your Nail for the Quarter, and ſay, 3 and 10 that was left in the 20, is 13, and 12 is 25, and 6 is 31; make another *Point*, and ſay, 3 and 12 is 15, which ſet down under its own Rank; and for the 2 *Points* or *Stops*, made for the Quarters, carry 2 to the Quarters, ſaying, 2 and 3 is 5, and 2 is 7, and 1 is 8, and 1 is 9, and 3 is 12: Now 12 Quarters is juſt 3*C.* wherefore ſet down 0, and carry 3 to the Hundreds; and proceed as in *Money*, (20 *C.* making a *Tun*, as 20*s.* did a Pound) ſaying, 3 and 7 is 10, and 5 is 15, and 7 is 22, and 7 is 29, and 9 is 38, and 4 is 42, and coming down with the Tens, ſay, and 10 is 52, and 10 is 62, and 10 is 72, and 10 is 82, which is four *Tuns*, and 2*C.* over; which I ſet down and carry 4 to the *Tuns*, ſaying, 4 and 9 is 13, and 2 is 15, and 7 is 22, and 9 is 31, and 5 is 36, and 7 is 43; and ſo the Sum is finiſhed, the Total being 43 *Tuns*, 02 *C.* 0 *qr.* and 15 *lb.* As in the *Example* may be ſeen.

The Figures over the Titles of each reſpective Denomination, ſhew what you muſt ſtop or point at, and are diſtinguiſhed thus; (10) (20) (4) and (28).

More Examples for Practice.

(10)	(20)	(4)	(28)
Tuns.	*C.*	*qr.*	*lb.*
74	13	0	15
46	11	1	17
44	09	2	06
74	19	3	16
44	07	0	21
74	14	1	15
359	15	2	06

(10)	(20)	(4)	(28)
Tuns.	*C.*	*qr.*	*lb.*
74	4	1	16
41	06	1	11
24	15	2	07
19	06	3	15
26	14	1	07
14	12	2	15
201	10	0	15

Twelve Hogſheads of Tobacco, containing, *viz.*

No.	C.	*qr.*	*lb.*
1	7	3	12
2	4	1	17
3	9	0	24
4	6	3	26
5	5	1	17
6	4	2	20
	38	2	04

No.	C.	*qr.*	*lb.*	*Tare*
7	5	1	24	90
8	4	2	19	94
9	4	3	23	99
10	3	3	21	84
11	4	1	23	79
12	4	3	24	96
	28	1	22	542

C.	*qr.*	*lb.*
71	1	19
47	3	24
57	2	16
71	0	21
47	1	12
51	2	06
347	0	14

C.	*qr.*	*lb.*
46	1	19
24	3	03
23	0	21
67	2	13
27	1	17
34	3	23
224	1	12

Avoirdupois *Small Weight.*

This is in uſe chiefly for *Silk*; as among *Stocking-makers, Weavers,* &c. they deliver their *Silk,* out and in, by *Pounds, Ounces,* and *Drams.*

Examples.

	(16)	(16)
lb.	*oz.*	*dr.*
4	10	06
7	14	12
5	07	04
9	14	15
4	05	07
6	11	14
39	00	10

	(16)	(16)
lb.	*oz.*	*dr.*
4	11	14
2	13	12
7	10	15
4	07	14
6	09	06
4	07	10
30	13	07

But in weighing Worſted, and ſome other Things, 'tis uſual to go no lower than a quarter of an Ounce; as in theſe *Examples.*

	(16)	(4)
lb.	*oz.*	*qr.*
4	13	1
7	12	2
9	11	3
7	04	2
4	13	1
34	07	1

	(16)	(4)
lb.	*oz.*	*qr.*
9	07	2
7	10	1
8	15	3
7	12	2
3	13	3
37	11	3

Wool is alſo weighed by *Avoirdupois* Weight, but differently divided, according to the following Table, *viz.*

Note that		or	*lb.*
	7 Pounds is one Clove,		
	2 Cloves, one Stone,		14
	2 Stone one Tod,		28
	6¼ Tod, one Wey,		182
	2 Weys, one Sack,		364
	12 Sacks, one Laſt.		4368

And in a *Laſt* of *Wool*, are	
	4368 Pounds,
	624 Cloves,
	312 Stone,
	156 Tod,
	24 Weys,
	12 Sacks,

Note, That the Wey differs in ſome Counties; as in *Suffolk*, the Wey is 336*lb.* or 42 Cloves, of 8*lb.* to the Clove; in *Eſſex* 256; or 32 Cloves, of 8*lb.* alſo to the Clove; and according to the Diviſion above 182*lb.*

TROY WEIGHT.

By this Weight are weighed *Jewels*, *Gold*, *Silver*, *Pearls*, *Electaries*, and *Liquors*. A Pint of *Water*, *Wine*, &c. being a Pound. and the uſual Denominations are *Pounds*, *Ounces*, *Penny Weights*, and *Grains*, as in the following Table.

Note,		make	
	24 *Grains*		1 *Penny Weight*.
	20 *Penny Weights*		1 *Ounce*
	12 *Ounces*		1 *Pound*.

In a Pound *Troy*, are	
	5760 *Grains*.
	240 *Penny Weights*.
	12 *Ounces*.

25*lb.* 1 Quarter of a Hundred.
100*lb.* 1 Hundred Weight.
20 Hundred 1 Tun of Gold or Silver.

The Value of Gold.	*l. s. d.*	*The Value of Silver.*	*l. s. d.*
1 Pound Wt. is worth	48-00-0	1 Pound Wt.	3-00-0
1 Ounce — —	4-00-0	1 Ounce, —	0-05-0
2 Penny-Weight, —	0-04-0	1 Penny-Wt.	0-00-3
1 Grain — — — —	0-00-2	1 Grain ½ *a Farthing*	

A Tun of Gold at 4*l.* the Ounce, *l.* 96000.
A Tun of Silver at 5*s.* the Ounce, *l.* 6000.

Examples of Troy Weight.

	(12)	(20)	(24)
l.	*oz.*	*dwt.*	*gr.*
4	10	12	20
5	04	06	13
7	07	07	06
5	04	19	14
4	11	04	14
6	04	17	21
34	07	08	16

	(12)	(20)	(24)
l.	*oz.*	*dwt.*	*gr.*
5	10	10	11
4	11	17	19
6	10	01	10
5	06	14	15
4	10	14	17
2	05	04	04
30	07	03	04

(12)	(20)	(24)
oz.	*dwt.*	*gr.*
24	13	10
19	11	15
07	04	14
21	13	16
11	05	23
08	04	12
14	07	10
15	10	11
122	11	15

(12)	(20)	(24)
oz.	*dwt.*	*gr.*
105	10	05
217	06	08
360	03	06
195	11	07
217	02	09
196	02	08
321	07	05
172	08	11
1785	11	11

Here is no Occaſion for Pointing, but only in the Grains: but if you do ſtop at more, only mind the Figures over the Titles, as before in *Avoirdupois Weight*, and they direct at what to Point.

Note, A Pound *Troy* is about 13 Ounces, 2 Drams and a half *Avoirdupois*; or as 14 to 17: And the Ounce *Troy*, as 56 to 51.

		l. s. d.
A Pound *Troy* of Gold	is worth	48-0-0
A Pound *Avoirdupois* of Gold		58-8-0

		l. s. d.
A Pound *Troy* of Silver	is worth	3-03 0
A Pound *Avoirdupois* of Silver		3-15-3$\frac{1}{2}$

	lb. oz.	
100*l.* in Gold weighs	1-11$\frac{3}{4}$	*Avoirdupois.*
100*l.* in Silver weighs	26-04 0	

A Pound *Avoirdupois* is heavier than a Pound *Troy*; but the Ounce *Avoirdupois* is lighter than the Ounce *Troy*; for the Ounce *Troy* weighs 480 Grains, but the Ounce *Avoirdupois* only 438 Grains.

APOTHECARIES WEIGHT.

Apothecaries have their Weight deduced from *Troy*; their Pound being the ſame to wit, 12 Ounces; but differently divided, as follows, *viz.*

20 Grains	make	1 Scruple
3 Scruples		1 Dram
8 Drams		1 Ounce
12 Ounces		1 Pound

By theſe Weights *Apothecaries* compound their Medicines; but they buy and ſell their Drugs by *Avoirdupois* Weight.

Examples.

(10)	(12)	(8)	(3)	(20)
lb.	*oz.*	*dr.*	*ſcr.*	*gr.*
4	10	7	2	9
3	10	6	1	10
2	09	5	0	06
1	08	4	2	04
1	06	3	1	12
1	00	0	0	00
15	10	3	2	1

(10)	(12)	(8)	(3)	(20)
lb.	*oz.*	*dr.*	*ſcr.*	*gr.*
48	7	1	1	17
12	11	4	2	12
24	06	7	1	07
19	10	5	2	12
34	07	6	0	00
24	04	4	1	15
165	00	6	1	03

Pound are	5760 Grains
	288 Scruples
	96 Drams
	12 Ounces

CLOTH MEASURE.

Notetha	4 Nails	make	1 Quarter
	4 Quarters		1 Yard
	5 Quarters		1 Ell *Engl.*
	3 Quarters		1 Ell *Flem.*

qrs.		*N.*		
3	o	12	make	1 Ell *Flemiſh*
4		16		1 Yard
5		20		1 Ell *Engliſh*
6		24		1 *French* Aulne, or Ell.

Examples.

Yds.	*qrs.*	*Nls.*	*El. Eng.*	*qrs.*	*Nls.*	*El. Flem.*	*qrs.*	*Nls.*
(10)	(4)	(4)	(10)	(5)	(4)	(10)	(3)	(4)
14	1	3	24	3	3	25	2	3
21	2	2	17	4	1	36	1	2
56	1	0	46	2	2	42	2	3
42	2	3	27	1	0	54	2	1
17	0	1	34	4	3	61	1	2
24	1	2	51	2	2	72	2	3
176	1	3	202	3	3	294	1	2

LIQUID MEASURE.

Is of two Sorts; one for *Wine*, *Spirits*, *Oil*, &c. And the other for *Ale* and *Beer*, the Tables of which are as follows,

In WINE MEASURE.

231 Solid Inches,	make	1 Gallon,
42 Gallons,		1 Tierce,
63 Gallons, or 1 Tierce & ½		1 Hogſhead,
2 Hogſheads		1 Pipe, or But
2 Pipes or Butts,		1 Tun.
84 Gallons.		1 Puncheon,

By this Meaſure all Wines, Brandies, Spirits, Strong Waters, Cyder, Perry, Mead, Oil, and Honey are ſold.

In a Tun are
- 2016 Pints,
- 1008 Quarts in a Tun.
- 252 Gallons.
- 14 Rundlets.
- 6 Tierces.
- 3 Puncheons.
- 4 Hogſheads.
- 2 Pipes, or Butts.

Note, 18 Gallons is a Rundlet.
31½ Gallons, is a *Wine* or *Vinegar-Barrel.*
A Tun weighs 18 C. *Avoirdupois.*

Note, *Oil and Honey are meaſured by Wine Meaſure.*

Note, That *Oil* hath but 236 Gallons to the Tun, except *Whale Oil* or *Oil* from *Greenland*, which hath 252 to the Tun,

In BEER MEASURE.

282 Solid Inches,	make	1 Gallon.
9 Gallons,		1 Firkin.
2 Firkins,		1 Kilderkin.
2 Kilderkins,		1 Barrels
1½ Barrel, or 54 Gallons		1 Hogſhead.

Note, *That in all other Places beſides* London, *the Firkin of Beer and Ale contains* 8½ *Gallons.*

In a Barrel of *Beer* are,	10152 Solid Inches.
	288 Pints.
	144 Quarts.
	72 Pottles.
	36 Gallons.
	4 Firkins.
	2 Kilderkins.

Note, That 3 Barrels, or 108 Gallons, make 1 Butt of *Beer*.

ALE MEASURE.

282 Solid Inches,	make	1 Gallon.
8 Gallons,		1 Firkin of *Ale*, *Soap*, or *Herrings*.
2 Firkins,		1 Kilderkin.
1½ Barr. or 48 Gal.		1 Hogſhead.

In a Barrel of *Ale* are,	9024 Solid Inches. 256 Pints. 128 Quarts. 64 Pottles. 32 Gallons. 4 Firkins, 3 Kilderkins.

The *Beer* and *Ale* Gallons are the ſame *viz.* 282 ſolid Inches, but with this Difference, *i. e.* the Barrel of *Beer* contains 128 Cubic Inches more than the Barrel of *Ale*, that is, 4 Gallons.

Examples of Wine Meaſure.

(10) *Tuns.*	(4) *Hds.*	(63) *Gal.*	(8) *Pints.*
71	2	19	4
24	1	27	6
12	2	56	4
42	0	37	7
15	3	60	2
166	3	12	7

(10) *Tuns,*	(4) *Hds.*	(63) *Gal.*	(8) *Pints.*
75	2	24	7
44	1	17	2
27	1	46	6
29	1	19	4
24	3	46	4
201	2	28	7

DRY MEASURE.

By this are meaſured all Sorts of *Grain*, *Salt*, *Sea-Coals*, &c.

Note That	2 Pin 2 Quarts 2 Pottles 2 Gallons 4 Pecks 8 Buſhels 4 Quarters 5 Quarters 2 Wey	is	1 Quart, 1 Pottle, 1 Gallon, 1 Peck, 1 Buſhel, 1 Quart or 2 Combes 1 Chaldron, 1 Wey, 1 Laſt.

Note, Four Pecks is one Buſhel, Land Meaſure, and 5 Pecks, one Buſhel, Water Meaſure.

Obſerve likewiſe, That when *Salt* and *Sea-Coal* are meaſured by the Corn Meaſure, they are heaped; or elſe there are 3 ſtriked Pecks to the Buſhel; and 36 Buſhel make a Chaldron of Coals; there being 21 Chaldron to the Score, in the River of *Thames*.

A Gallon contains $268\frac{4}{5}$ Cubic Inches; and a Buſhel of Corn, $2150\frac{2}{3}$ Cubic Inches.

Note, A Buſhel ought to be $18\frac{1}{2}$ Inches wide, and 18 Inches deep; as by Act of Parliament, in 1697.

Some make 6 Quarters of Meal a Wey; and 1 Wey, 3 Quarters, a Laſt.

Examples of Dry Meaſure.

(10)	(8)	(4)	(2)
Qu.	*Buſh.*	*Pecks.*	*Gal.*
24	6	2	1
17	3	2	0
20	7	1	1
15	5	0	1
21	2	1	1
19	4	2	0
119	5	2	0

(10)	(4)	(8)	(4)
Chal.	*Qu.*	*Buſh.*	*Pecks.*
174	3	6	3
241	1	7	2
296	2	4	3
171	1	5	0
097	0	5	2
471	2	4	3
1453	1	2	1

LONG MEASURE.

Note,

3 Barley Corns make one Inch.
12 Inches one Foot.
3 Foot one Yard.
3 Foot 9 Inches, one Ell Engliſh.
2 Yards, or 6 Foot, one Fathom.
5 Yards$\frac{1}{2}$ or 16 Foot$\frac{1}{2}$, 1 Pole.
40 Poles, or 220 Yards, one Furlong.
8 Furlongs, or 1760 Yards, one Mile.
3 Miles one League.
60 Minutes 1 Degree, which is equal to about 69 *Engliſh* Miles.
360 Degrees, or 24840 Miles is equal to the Circumference of the Earth and Sea.

Note, That an *Engliſh* Mile, is 286 Feet leſs than an *Italian* Mile. And that 5 Foot is a Geometrical Pace.

In a Mile are

190080 Barley-Corns.
63360 Inches.
5280 Feet.
1760 Yards.
320 Poles.
8 Furlongs.
80 Chains.
1056 Paces.
1408 Ells.
8000 Links of the Gunter's Chain.

Examples in Long Meaſure.

(10)	(8)	(40)
Miles.	*Furl.*	*Poles.*
24	6	22
37	5	26
15	4	34
74	3	39
41	7	24
194	4	25

(10)	(8)	(40)
Miles.	*Furl.*	*Poles.*
37	4	21
20	3	17
42	5	19
31	0	27
52	4	19
185	0	23

From the preceding Table of *Long Meaſure*, is deduced this of *Land Meaſure*, viz.

Forty Poles, (or Perches) in Length, and 4 in Breadth, make an Acre; or 160 ſquare Perches. Or 4840 ſquare Yards make an Acre; or 43560 ſquare Feet.

A *Hide* of Land is 100 Acres; 40 ſquare Poles make a Rood, and 4 Roods an Acre.

Note, the Pole, or Perch, of 16 Feet ½ is *Statute Meaſure*; but there are ſome cuſtomary Meaſures which are more; as for Fens and Woodlands, there are reckoned 18 Feet to the Pole; and for Foreſts 21 Feet to the Pole.

Examples.

(10)	(4)	(40)
Acres.	*Roods.*	*Poles.*
14	2	24
26	3	29
17	1	19
26	2	20
36	2	36
24	1	12
146	2	20

(10)	(4)	(40)
Acres.	*Roods.*	*Poles.*
74	2	27
61	1	20
20	2	36
14	3	11
37	1	10
27	2	34
236	2	18

TIME

Is meaſured by Years, Months, Days, Hours, and Minutes as in the Table following,

Mark'd			*In a Year are.*
60″Seconds	make	1 Minute.	31557600 *Seconds.*
60′Minutes		1 Hour.	525960 *Min.*
24 Hours		1 Day natural	8766 *Hours.*
7 Days		1 Week.	365 *Days.*
4 Weeks		1 Month.	52 *Weeks.*
13 Months		1 Solar Year, (1 Day, and 6 Hours.	

A *Century* is 100 Years; an *Indiction* among the *Romans*, a Revolution of 15 Years.

Of the Motion *of the Heavenly Bodies.*

60″Seconds	make	1 Minute.
60′Minutes		1 Degree.
30 Degrees		1 Sign
12 Signs, or 360 Degrees		1 Revolution of the (whole *Sphere*, or 360 Degrees.

DOZENS.

There are ſeveral Commodities ſold by the Dozen, a Table of which follows, *viz.*

In a great Groſs are	1728 Pieces or Things
	144 Dozens.
	12 Small Groſs.

SQUARE MEASURE.

16 Quarters of an Inch	is	one Inch.
144 Inches		one Foot.
9 Foot		one Yard.
30 Yards ¼ or 272¼ ſquare Feet		one Pole.
40 Poles long and one broad		one Rood.
4 Roods		one Acre.
640 Acres		one Mile.

In a ſquare Acre are 4 ſquare Roods, 160 ſquare Poles, *&c.* and in a ſquare Pole, 30 ſquare Yards ¼

In a ſquare Mile are	4014489600 Inches.
	27878400 Feet.
	3097600 Yards.
	102400 Poles.
	2560 Roods.
	640 Acres.

Some other Things neceſſary to be known, and of Uſe in Arithmetic.

Of FISH.

124 of *Ling*, *Codd*, or *Haberdine*, to the Hundred, *viz.*

120	accounted	100
1200		1000
12000		A Laſt, or 12 Barrels,

PAPER and PARCHMENT.

1 Bale is 10 Ream; 1 Ream 20 Quires; 1 Quire 24 (or 25) Sheets; 1 Roll of Parchment, 5 Dozen; 1 Dozen, 12 Skins.

Of WOOD.

A Cord of Wood is 4 Feet over, 4 Feet deep and 8 Feet long, being 128 Cubic Feet. A Stack of Wood is 3 Feet over, 3 Feet deep, and 12 Feet long, being 108 Cubic Feet.

Block Wood, being great Logs, are ſold by the Cord, and ſmall by the Stack. A Cubic Foot is 1728 Cubic Inches. A Cubic Yard is 27 Cubic Feet, or 46656 Inches. 4 Inches is a Hand, in meaſuring a Horſe. 2 Feet is 1 Pace, 4 Poles, or 100 Links, 1 Chain. 125 Geometrical Paces 1 Stade, 8 Stades an *Italian* Mile. 4000 Geometrical Paces a ſmall *German* Mile, and 5000 a Great. 160 Perches in Length, and 1 in Breadth; or 80 in Length, and 2 in Breadth; or 40 in Length, and 4 in Breadth, make an Acre of Land. 10 Foot every Way is a *Square*; that is 100 ſquare Feet. A Faggot of *Steel*, 120*lb.* A Burthen of *Gad-ſteel* 9 Score, or 180*lb.* A Sack of Coals, 3 Buſhels; *Scots* Coals 112*lb.* to the *C.* A Load of Timber 50 Foot, a Tun 40. A Load of Hay, 36 Truſſes, and 56*lb.* the Truſs; or 4 Stone, at 14*lb.* the Stone; but new Hay ought to be 60*lb.* the Truſs. 500 of Bricks a Load; and 1000 plain Tiles the ſame. 25 Buſhels of Lime 1 *C.* A Brick ought to be 9 Inches long, $4\frac{1}{2}$ broad, and $2\frac{1}{4}$ thick. A Tun of Train-Oil, 252 Gallons; a Tun of Sweet-Oil 236 Gallons. Raw-Silk (except *China*) is 24 Ounces to the Pound. A Tun of Lead called a Fodder,; $19\frac{1}{2}$ *C.* A Gallon of wheaten Meal weighs 7*lb. Avoirdupois.* A Dicker of Hides, or Skins, are 10; and 20 Dickers a Laſt. A Stone of Glaſs is 5*lb*; a Seam of Glaſs is 24 Stone. 40 Skins make a Timber of *Sables*, *Martins*, *Minks*, *Jennits*, *Fitches* and *Greys*. 120 to the Hundred of *Conies*, *Kid*, *Lamb*, *Budge*, and *Cat-skins*; 50 to a Kid of *Goat-ſkins*; and 13 tann'd *Calf-ſkins* a Dozen.

* * *

CHAP. III.

SUBTRACTION.

IS the taking of a leſſer Number, or Sum, out of a greater, thereby to find the Remainder, or Difference between the ſaid two Numbers: As if you take 13 from 19, the Remainder, or Difference is 6.

SUBTRACTION is of one Denomination, or of divers.

Of one, when the two Numbers are both of one Kind; that is, both *Yards*, *Gallons*, *Pounds*,

Of divers, when the two Sums conſiſt of *Pounds Shillings*, and *Pence*, or *Tuns*, *Hundreds*, *Quarters*, and *Pounds*, &c.

SUBTRACTION is juſt the Reverſe of *Addition*; for *that* puts the Numbers together, and *this* takes Numbers from each other.

In ſetting down Numbers for Work, you muſt always place the greater Number, or Sum, uppermoſt; and in ſuch Order that Units may ſtand under Units, Tens under Tens, Hundreds under Hundreds, as before in *Addition*.

A General Rule.

Whatever you ſtop at in *Addition*, the ſame you borrow in *Subtraction*, when Need requires, remembring always to pay it to the next Figure towards the left Hand.

Example 1.

Suppoſe I would know the Difference between 453 Yards bought, and 232 Yards ſold.

I ſet them down as underneath, and as before recited *viz.*

	Yards.	
Bought,	453	Greater Number.
Sold,	232	The Leſſer.
Difference,	221	Remains, unſold.
	453	Proof.

After I have drawn a Line under the Sum, I begin at the firſt Figure towards the Right Hand, (as in *Addition)* and ſay, 2 from 3, (the Figure juſt over it) and there remains 1, ſetting it in its proper Place under the Line; and then go to the next Figure, ſaying, 3 from 5, and there remains 2, which I alſo put under the Line; and then to the laſt Figure, ſaying 2, from 4, and there remains 2, and the Work is done; and I find the Remainder of Yards unſold to be 221; or that 453 is 221 more than 232; to prove the Truth of which, I add the Remainder, or Difference, to the Leſſer Number; and if they Two, put together, make the greater, or upper Number, the Sum is right, otherwiſe not; wherefore I ſay, 1 and 2 is 3; and 2 and 3 is 5; and 2 and 2 is 4, which are the ſame Figures with the upper or greater Number. Wherefore I know the Work is right, as may be ſeen in the Example. And by this Way are all Sums of one Denomination prov'd in this Rule.

Example 2.

Let it be required to find the Difference between 756 Gallons received, and 444 Gallons delivered. To do which, I ſet the Numbers, the one under the other, as before directed, and they ſtand thus,

Gall.
756 Greater.
444 Leſſer.

312 Rem.

756 Proof.

Then having drawn a Line under them, I begin and ſay, 4 from 6, and there reſts 2; and 4 from 5, and there remains 1; and 4 from 7, and there remains 3: So the Work being done, I find the Difference to be 312; or ſo many Gallons remaining. And it is proved by *Addition*, as before; as may be ſeen by the Work above.

When any one of the under Figures is greater than the Figure over it, then you muſt borrow 10, (as you carried 10 in *Addition)* and put it to the Figure from whence you were to ſubtract, and then take it from their Sum, paying 1 for the ſaid 10 borrowed, to the next Figure towards the left Hand in the lower Line.

Example 3.

I would ſubtract 496 Pounds paid, from 654 Pounds lent, *viz.*

l.
Lent, 654 *Greater.*
Paid, 496 *Leſſer.*

158

654 Proof.

Having ſet down the Numbers as before directed with a Line under them, I ſay, 6 from 4 I cannot, but (putting 10 to the ſaid 4, it is made 14) 6 from 14, and there remains 8, which I ſet down under the Line; then I ſay, 1 that I borrowed, and 9 (the next Figure) is 10, from 5 I cannot, but 10 from 15, (adding 10 to the 5) and there reſts 5, which I alſo ſet down; then, 1 that I borrowed, and 4 is 5, from 6, and there remains 1. The Sum being thus finiſhed, I find that there remains due or unpaid, 158 Pounds, which is proved by *Addition*, as before.

Example 4.

Suppoſe there is advanced on a *Subſidy*.

	l.
	636420
Paid off,	47294
Remainder,	589126
Proof.	636420

How much remains?

Here I ſay, 4 from nothing I cannot, but 4 from 10, and there remains 6; 1 that I borrowed, and 9 is 10, from 2 I cannot, but 10 from 12, and there reſts 2; then 1 that I borrowed, and 2 is 3, from 4, and there remains one; (here I borrow none, ſo muſt not pay any thing to the next Figure) then 7 from 6 I cannot, but 7 from 16, and there remains 9; 1 that I borrowed, and 4 is 5, from 3 I cannot, but 5 from 13, and there remains 8; and now becauſe there is no Figure ſtanding under the 6, to carry the 1 borrowed to, I ſuppoſe a (0) to be placed there, and ſay, 1 that I borrowed, and 0 is 1, from 6, and there remains 5; and ſo the Work is done, and the Remainder is 589126, as in the *Example*.

More Examples for Practice.

	l.		*Ells.*
Borrowed,	14075	Bought,	74000
Paid	08424	Sold,	29460
Reſt due,	5651	Reſt unſold,	44540
Proof;	14075	Proof,	74000

	Sheep.		
Received,	492	Advanced,	47692
Delivered,	397	Paid off,	29767
Remains	95	Remains,	17925
Proof,	492	Proof,	47692

Some Queſtions proper to this Rule, ſhewing its Nature and Uſe.

Queſt. 1. What is the Difference between a Piece of Timber, containing 56 Feet, and another Piece of 29 Feet?

Feet
56
29
Anſ. 27

Queſt. 2. A Man borrowed, *l.* 96 and paid 58, what remains due?

96
58
Anſw. 38

Queſt. 3. If a Perſon hath 150 Miles to travel, and hath gone 99 Miles, how many Miles hath he yet to go?

Miles
150
99
Anſw. 51

From 100 *Pounds borrowed, take* 72 *paid?*
'Twas a Virgin that lent it, what's due to the Maid
Anſw. *l.* 28

Queſt. 4. If a Perſon be 48 Years of Age this preſent Year, what Year was he born in?

Years.
1767
48
Anſw. 1719

Queſt. 5. How many Years ſince the *Spaniſh* Invaſion, it being in the Year 1588?

Y.
Greater Number, 1767
Leſſer Number. 1588
179

From 90 *take* 30, *from* 40 *take* 10;
Subtract 6 *from* 60, *and what remains then?*
Anſw. 144

Queſt. 6. What Number muſt be put to 297*l.* to make it 730?

730
297

Anſw. 433

Proof. 730

In Fifteen Hundred 92 *there dy'd a noble Prince:*
How many Years is it ago, that is, how many ſince?

1767
1592

Anſw. 175

Queſt. 7. What five Numbers, and all different, will make 65?

To do this, ſet down four different Numbers at random, obſerving that they do not amount to the Number propoſed; and add them together, and ſubtract that Total from the Number propoſed, and the Remainder will be the fifth Number, to make the other Numbers 65, as in the following

Example.

65 The Number propoſed.

12
13
9 The four Numbers ſet
16 down at random

50 Total.

15 The 5th Number.

And ſo of any other Number propoſed to be made up by different Numbers, let them be 5, 6, 7, *&c.* Remembring always that, the random Numbers be leſs than the Numbers propoſed to make up the Numbers aſſigned.

Of MONEY.

When the Sums to be ſubtracted, are of divers Denominations, whether they be *Money*, *Weight*, or *Meaſure*, the ſame Method muſt be obſerved in ſetting them down as in *Addition*; that is, the ſeveral Names muſt be ſet juſt under one another; as Pounds under Pounds, Shillings under Shillings, and Pence under Pence, *&c.* with *Points*, or *Strokes*, of *Separation*, between them; always obſerving that the great Sum muſt be uppermoſt, as before, in Sums of one Denomination. Then proceed to take the under Sum out of the uppermoſt, beginning at the leaſt Denomination towards the right Hand, as in *Addition*: and the ſame Reſpect muſt be had, when there is Occaſion to borrow as before in *Addition*, obſerving how many of the leſſer Denomination make one of the next greater, and borrow accordingly; remembring always to pay what you borrow to the next Denomination.

Example.

I would ſubtract 247*l.* 11*s.* 9*d.* ½. *Disburſements* rom 372*l.* 11*s.* 6*d.* ¼. *Received.* To do which, I ſet them down as before directed; and then they ſtand thus.

	l.	*s.*	*d.*	
Received,	372	11	6 ¼	Greater.
Diſburſm.	247	11	9 ½	Leſſer,
Remains.	124	19	8 ¾.	
Proof.	372	11	6 ¼	

I begin at the leaſt Denomination towards the right Hand, *viz.* Farthings; ſaying 2 from 1 I cannot, wherefore I borrow one from the next Name, which is Pence, one of which is 4 Farthings, but 2 from 4 and there remains two, (which Remainder always add to the upper Number, or Figure you ſubtract from, for the more eaſy Reckoning) and the 1 Farthing over it makes ¾, which I place under the Line, and go to the next Denomination of Pence, ſaying, 1 that I borrowed, and 9 is 10, from 6 Pence I cannot, but borrow one of the next, which is Shillings, one of which is 12 Pence; but 10 Pence from 12 Pence, and there remains 2, which I put to the Figure 6 I ſubtract from, and it makes 8, which I alſo put under the Line, in its proper Place; and then I go to the next Denomination, which is Shillings, ſaying 1 that I borrowed and 11 is 12, from 11 Shillings I cannot, wherefore I borrow one of the next which is Pounds, (one of which is 20 Shillings) but 12 from 20 and there remains 8, and the 11 Shillings over it, which I ſubtract from, is 19, which I place under the Line, in its Place, then going to the Pounds, I ſay, 1 that I borrowed, and 7 is 8, from 2 I cannot, (here I borrow 10, as in Sums of one Denomination) but 8 from 12, and there remains 4; then, 1 that I borrowed and 4 is 5, from 7 and there remains 2; and laſtly, 2 from 3, and there remains 1: And ſo the Sum is finiſhed; and the Remainder or Difference is 124*l.* 19*s.* 8*d.* ¾. as by the Example may be ſeen.

Example 2.

A Collector of the *Exciſe*, has received 2479*l.* 12*s.* 6*d.* ¾. and paid into the Office by ſeveral Remittances, 1977*l.* 11*s.* 2*d.* How much remains in his Hands?

	l.	*s.*	*d.*
Received,	2479	12	6¾
Paid,	1977	11	2
	502	01	4¾
Proof.	2479	12	6¾

Here I begin, and ſay, nothing from ¾, and there remains ¾; and 2 from 6, and there remains 4; and 11 from 12, and there remains 1; and then I go to the Pounds, ſaying 7 from 9, and there remains 2; and 7 from 7, and there remains 0; and 9 from 4 I cannot, but 9 from 14, and there remains 5; and 1 that I borrowed, and 1 is 2, from 2, and there remains 0; and ſo the Sum is done; and he hath remaining in his Hand, 502*l.* 01*s.* 4*d.* ¾, as by the ſaid Work.

More Examples for Practice.

		(20)	(12)		(20)	(12)	(10)	(20)	(12)
	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
From	7	10	1	5	00	0	77	00	7
Take	4	07	9	3	11	5	57	04	6
Rem.	3	02	4	1	08	7	19	16	1
Proof	7	10	1	5	00	0	77	00	7

		(20)	(12)(4)		(20)	(12)(4)		(20)	(12)(4)
	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
Dr.	7	11	1 ½	476	10	9 ¼	7	00	0
Cr.	4	17	3 ¼	277	17	7 ¼	4	10	4 ¾
Bal.	2	13	10 ¼	198	13	2	2	09	7 ¼
Pr.	7	11	1 ½	476	10	9 ¼	7	00	0

	(10)	(20)	(12)	(4)	(10)	(20)	(12)	(4)
	l.	*s.*	*d.*	*qr.*	*l.*	*s.*	*d.*	*qr.*
Borrowed,	419	02	10	¼	7174	11	1	
Paid,	197	03	10	½	2176	15	9	¼
Rem. due,	221	18	11	¾	4997	15	3	¾
Proof.	419	02	10	¼	7174	11	1	

When a Sum is borrowed, or a Debt paid, at ſeveral Times, then you muſt add the ſeveral Sums of Payment into one Total, and ſubtract that Total from the firſt lent, or otherwiſe due.

Example.

Suppoſe *A.* lends *B.* 70*l.* and *B.* hath paid *A.* at ſeveral Times, *viz.*

Lent, — — —	70	00	0
Paid at one Time, —	24	10	0
Another Time, —	7	11	6
Another, — — —	20	00	0
Another, —	4	10	6
Another, — — —	1	01	6
Paid in all.	57	13	6
Remains due,	12	06	6
Proof,	70	00	0

To prove this, add the Sum paid in all, and the Sum reſting due, together; and if they make the Sum firſt lent, the Work is right.

	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
Lent	7	10	0	560	10	9¼	1	01	6
Paid at ſeveral Times.	1	10	6	146	10	5	0	07	6
	0	11	9	17	15	0	0	01	6
	0	07	6	97	7	6	0	02	6
	2	10	6	76	00	0	0	01	6
	0	07	9	100	17	4	0	02	0
	1	10	0	100	01	7	0	01	0
Pd. in all	6	18	0	538	11	10	0	16	0
Rem.	0	12	0	21	18	11¼	0	05	0
Proof.	7	10	0	560	10	9¼	1	01	6

A familiar Example.

	l.	*s.*	*d.*
Received of Mr. *Eaſt*, — — —	59	06	0
pd. to Mr. *Weſt*,	20	00	0
pd. to Mr. *North*,	14	13	6
pd. to Mr. *South*,	15	12	0
Paid in all	50	05	6
Remains in the Bag,	09	00	6

What eight Sums of Pounds, Shillings and Pence, and all different, will amount to juſt 50*l.*

To do this, you muſt obſerve the Directions given in *Page* 47. *Example* 7. for the Sums of one Denomination; and ſee the following Work.

From *l.*	50	00	0	the Sum aſſigned.
The Seven Sums ſet down at random.	4	17	6	
	5	01	6	
	1	01	6	
	7	11	4	
	6	04	2	
	9	03	9	
	1	13	5	
Subtract	35	13	2	
Remainder,	14	06	10	The eighth Sum.

AVOIRDUPOIS-WEIGHT.

Here you are only to obſerve the Title of your Account, and borrow according, when there is Occaſion.

Example 1.

An *Ironmonger* buys 74 Tuns, 13C. 2qrs. 14*lb.* of *Bilboa* Iron, and hath ſold out of the ſaid Parcel, 56 Tons, 11C. 1qr. 20lb. how much remains unſold?

I ſet down the Sum as before directed, that each Denomination may ſtand under that of the ſame Kind, and draw a Line under them, as may be ſeen in the Margin.

I begin at the right Hand, and ſay, 20 from 14 I cannot, but 20 from 28, (ſo many lb. making a *qr.* of a Hundred an Integer of the next Name) and there remains 8; which add to the 14, and they make 22, which I place under the Line; and go to the Quarters, and ſay 1 that I borrowed, and 1 is 2, from 2, and there remains 0; which I alſo ſet down; then 11 from 13*C.* and there reſts 2, which I likewiſe put down, and go to the Tuns, ſaying 6 from 4 I cannot, but 6 from 14, and there remains 8; then 1 that I borrowed, and 5 is 6, from 7, and there reſts 1. And ſo the Work is done, and I find there remains unſold 18 *Tons.* 2*C.* 0*qr.* 22lb.

	(10)	(20)	(4)	(28)
	Tuns.	*C.*	*qrs.*	*lb.*
	74	13	2	14
	56	11	1	20
	18	02	0	22
proof.	74	13	2	14

Example 2.

A *Grocer* buys 96*C.* 2*qrs.* 20*lb.* of *Raiſins*, and ſells out again, 49*C.* 3*qrs.* 24*lb.* what Quantity remains in his Hands?

	C.	*qrs.*	*lb.*	
Bought,	96	2	20	Greater Number.
Sold,	49	3	24	Leſſer Number.
Remains in Hands	46	2	24	
Proof.	96	2	20	

Here I ſay, 24 from 20 I cannot, but 24 from 28, and there remains 4; and the 20 over it, makes 24, which I ſet down; then 1 that I borrow, and 3 is 4, from 2 I cannot, but 4 from 4, and there reſts 0; but 2 that ſtands over it, is 2, which I ſet down: then 1 that I borrowed and 9 is 10 from 6 I cannot, but 10 from 16, and there reſts 6, and 1 that I borrowed, and 4 is 5, from 9, and there remains 4. So there remains in his Hands 46*C.* 2*qrs.* 24*lb.* which is proved by *Addition*, by adding the Remainder and *Leſſer* Sum together, and they make the *Greater*; and therefore the Work is right.

Examples for Practice.

	(10)	(20)	(4)	(28)
	Tuns.	*C.*	*qrs.*	*lb.*
Received,	700	11	1	17
Deduct.	421	04	2	20
Rem.	279	06	2	25
Proof.	700	11	1	17

(10)	(4)	(28)
C.	*qrs.*	*lb.*
756	3	24
327	1	25
429	1	27
756	3	24

C.	*qrs.*	*lb.*
4	0	12
3	1	07
0	3	05
4	0	12

C.	*qrs.*	*lb.*
24	1	12
19	2	24
04	2	16
24	1	12

C.	*qrs.*	*lb.*
9	0	00
5	3	15
3	0	13
9	0	00

Admit, I have on board of a Ship from *Jamaica*, 94 *Tuns*, 13*C.* 0*qrs.* 00*lb.* of *Log-Wood*, and have received by ſeveral Lighters, as follows, *viz.*

On

	(10) *Tuns.*	(20) *C.*	(4) *qrs.*	(28) *lb.*
On Board,	94	13	0	00
By one Lighter,	12	11	3	09
Another,	19	14	0	21
Another,	17	12	2	24
Another,	15	14	3	06
Received,	65	13	2	04
Remains on board,	28	19	1	24

	(10) *C.*	(4) *qrs.*	(28) *lb.*		(10) *C.*	(2) *qrs.*	(28) *lb.*
	49	3	22	*Currants,*	70	2	20
Sold at ſeveral Times.	4	1	24		10	1	14
	9	2	17		7	2	14
	4	1	25		1	1	20
	7	3	20		12	1	19
	8	1	27		9	3	12
	9	2	20		10	0	00
Sold in all,	44	2	21		51	2	23
Rem. unſold	5	1	1		18	3	25
Proof.	49	3	22		70	2	20

AVOIRDUPOIS SMALL WEIGHT.

	(10) *lb.*	(16) *oz.*	(16) *dr.*	(10) *lb.*	(16) *oz.*	(16) *dr.*
Delivered,	4	10	14	46	13	10
Received,	2	09	9	27	15	14
Rem.	2	01	05	18	13	12
Proof.	4	10	14	46	13	10

	(10)	(16)	(16)	(10)	(16)	(16)
	lb.	*oz.*	*dr.*	*lb.*	*oz.*	*dr.*
Delivered	55	00	00	79	15	14
Received	37	10	14	49	15	15
Reſts due	17	05	02	29	15	15
Proof.	55	00	00	79	15	14

TROY-WEIGHT.

	(10)	(12)	(20)	(24)	(10)	(20)	(24)
	lb.	*oz.*	*dwt.*	*gr.*	*lb.*	*dwt.*	*gr.*
Received	24	09	14	12	756	12	15
Melted	19	07	15	20	478	11	22
Remains	05	01	18	16	278	00	17
Proof.	24	09	14	12	756	12	15

	(10)	(12)	(20)	(24)	(10)	(20)	(24)
	lb.	*oz.*	*dwt.*	*gr.*	*oz.*	*dwt.*	*gr.*
Received	370	07	12	20	7420	15	20
Delivered	174	11	09	22	5789	18	15
Remains	195	08	02	22	1630	17	05
Proof.	370	07	12	20	7420	15	20

CLOTH-MEASURE.

	(10)	(4)	(4)	(10)	(5)	(4)
	Yds.	*qrs.*	*N.*	*Ells Eng.*	*qrs.*	*N.*
Bought	54	2	2	420	3	2
Sold	27	2		247	0	3
Remains	26	3	3	173	2	3
Proof.	54	2	2	420	3	2

I

I might give Examples in *Subtraction* of all the other Rules mentioned before in *Addition*, viz. of *Apothecaries* Weight, *Dry* and *Liquid Meaſure*, &c. but all of them being worked in the ſame manner with thoſe before, it is unneceſſary.

* * *

CHAP. IV.

MULTIPLICATION.

I. IN this Rule there are always two Numbers given to find out the Third, which will contain either of the given Numbers, as often as the other containeth Units.

II. This Rule alſo excellently and moſt conciſely performeth the Work of *Addition*, either in ſimple or compound Numbers; as ſhall be illuſtrated and proved by ſundry *Examples*, *Explications*, and *Improvements*, not hitherto treated of.

III. It likewiſe ſerveth to bring great Denominations into leſs, of the ſame Value; as *Pounds* into *Farthings*; and *Tuns Weight* into *Pounds*, &c.

IV. *Multiplication* hath three Parts, or Things, particularly to be noted and known, *viz.*

1ſt The *Multiplicand*, or *Number* to be *multiplied*; and is generally the greateſt of the two Numbers given.

2dly The *Multiplier* or *Number* by which you *multiply*; and is generally the leaſt of the two Numbers given.

3dly The *Product*, or Reſult of the *Multiplication*; which is the Anſwer.

V. Before any Procedure can be made, the following *Table* muſt be got perfectly by Heart.

MULTIPLICATION-TABLE.

2 Times or rather twice	2 is	4
	3	6
	4	8
	5	10
	6	12
	7	14
	8	16
	9	18
	10	20
	11	22
	12	24
3 Times	3 is	9
	4	12
	5	15
	6	18
	7	21
	8	24
	9	27
	10	30
	11	33
	12	36
4 Times	4 is	16
	5	20
	6	24
	7	28
	8	32
	9	36
	10	40
	11	44
	12	48
5 Times	5 is	25
	6	30
	7	35
	8	40
	9	45
5 Times	10 is	50
	11	55
	12	60
6 Times	6 is	36
	7	42
	8	48
	9	54
	10	60
	11	66
	12	72
7 Times	7 is	49
	8	56
	9	63
	10	70
	11	77
	12	84
8 Times	8 is	64
	9	72
	10	80
	11	88
	12	96
9 Times	9 is	81
	10	90
	11	99
	12	108
10Times	10 is	100
	11	110
	12	120
11 Times	11 is	121
	12	132
12Times	12 is	144

The foregoing Table is ſo plain and eaſy, that it needs no Explanation; and therefore I ſhall proceed immediately to the Rule of working.

VI. When any Number is given to be multiplied by another, ſet the biggeſt uppermoſt, which is the *Multiplicand*, and under that your *Multiplier*, in the ſame Order as in *Addition* and *Subtraction*, viz. Units under Units, Tens under Tens, *&c.* Then draw a Line and proceed, beginning at the Right-hand, and multiply every particular Figure of the *Multiplicand* by the *Multiplier*.

Example 1.

How much is 3 times 472 *Multiplicand.*
3 *Multiplier.*
Anſw. 1416 *Product.*

Here I ſay 3 times 2 is 6, which I put under the Line, as in the *Example*; then 3 times 7 is 21, I ſet down 1, and carry 2, for the two Tens, to the next (as in *Addition* of one Denomination;) then 3 times 4 is 12, and 2 that I carry is 14; ſo becauſe it is the laſt Figure, I ſet down 14, and the Work is done; ſo I find that 3 times 472 is 1416, the *Product*, or Reſult of 472 multiplied by 3.

If the ſaid 472 be 3 times ſet down, one under the other, and added together, the Total will be the ſame with the Product above, which ſhews, that *Multiplication* briefly performs the Work of *Addition*, (as was ſaid before) which is ſhewn in the Margin.

472
472
472
1416

Example

Example 2.

How many makes 742 *Multiplicand.*
Multiplied by 4 *Multiplier.*

2968 *Product.*

Here I ſay, 4 times 2 is 8, which I ſet down under the Line; then 4 times 4 is 16: I ſet down 6, and carry 1 for the Ten to the next Figure; then 4 times 7 is 28, and 1 that I carry is 29; and it being the laſt, I ſet it down: ſo the Work is done, and I find the Product, or Anſwer, to be 2968, as above.

To prove the Work, multiply the *Multiplier* by the *Multiplicand*, and if the Product is the ſame Figures as before, it is right. This is the quickeſt and beſt Way of proving *Multiplication*, till *Diviſion* be known.

I do not move the Sum to any other Place, but let it ſtand as before multiply'd, and begin with the firſt Figure of the *Multiplicand*, towards the Right-hand, to multiply the *Multiplier*, ſaying twice 4 is 8, which I find to be right. Then to the next Figure, which is 4, and multiply the *Multiplier*, by that, ſaying, 4 times 4 is 16, which is 6, and carry 1, which I alſo find right. Then to the next and laſt Figure in the *Multiplicand*, which is 7, and multiply the *Multiplier* 4 by that alſo, ſaying, 7 times 4 is 28, and one that I carried is 29, which I likewiſe find right: And ſo the Work is proved, and known to be truly wrought.

Example 3.

What is the Product of 90704 *Multiplicand.*
Multiplied by 8 *Multiplier.*

725632

Here I begin, ſaying, 8 times 4 is 32, I ſet down 2, and carry 3; then 8 times 0 is 0, but 3 that I carry is 3; then 8 times 7 is 56, I ſet down 6 and carry 5, and then 8 times 0 is 0, but 5 that I carry is 5. Laſtly 8 times 9 is 72, which I ſet down and the Work is done; as by the *Example* above. And this is proved as before, by multiplying the *Multiplier* by the *Multiplicand*, ſaying 4 times 8 is 32, *&c.*

This Way of Proof is alſo a perfecting any one in the *Multiplication-Table*; becauſe the Digits, or Nine Figures, are multiplied forwards and backwards: So that they may as readily anſwer, that 9 times 8 is 72, (not found in the Table, but reverſely) as that 8 times 9 is the ſame.

More Examples for Practice.

Multiply 7460 *Multiplicand.*
By 7 *Multiplier.*

52220 *Product, or Anſwer.*

How many are 9 times 365?
Or, how many Days in 9 Years.

3285

Multiplicand 432107
Multiplier 5

2160535

596324
6

3577944

709543
7

4966801

675908
8

5407264

7654309
9

68888781

VII. When the Multiplier conſiſts of more Figures than One, then there muſt be as many ſeveral Products as there are Figures in the Multiplier, and placed under the Line and added together, and the Total is the whole Product required. But obſerve always to place the firſt Figure of each Product juſt under the Figure you multiply by, and ſo you move one Place towards the Left-hand for every Product, be as many as there will.

Example 1.

How much is 24 times —— 365 Multiplicand.
or, how many Hours in a Year? 24 Multiplier.

1460 Product by 4.
730 Product by 2.

8760 Total Product.

The Numbers being placed in Order, as above, and according to the VIth *Rule* of this Chapter, after having drawn a Line under them, I begin with the firſt Figure in the Multiplier, *viz.* 4, ſaying, 4 times 5 is 20, ſet down 0, and carry 2; then 4 times 6 is 24, and 2 I carry is 26, that is 6 and carry 2; then 4 times 3 is 12, and 2 is 14; and ſo I have done with the Figure 4. Then I go to the ſecond Figure in the Multiplier, *viz.* 2, and multiply the Multiplicand 365, by that alſo, ſaying, twice 5 is 10, I ſet down 0 and carry 1, which 0 I ſet down juſt under the Figure 2, that I multiply by, and go a Place farther to the Left hand, as was ſaid before. Then I go on, ſaying, twice 6 is 12, and 1 that I carry is 13, that is 3, and carry 1, and twice 3 is 6, and 1 is 7; and ſo I have done with this Figure of the Multiplier alſo; and then I draw a Line under theſe two Products, and add them together, and they make 8760 for Anſwer. And ſo the Work is done, as may be ſeen in the *Example* above, and may be proved as before.

Example

Example 2.

```
Let it be required to multiply ——      527537
By — — — — — — — —                        285
                                    ---------
                                      2637685
                                     4220296
                                    1055074
                                    ---------
                                    150348045
                                    ---------
```

A Line being drawn under the two Numbers, I proceed, ſaying, 5 times 7 is 35, &c. going thro' all the Figures of the Multiplicand by 5, and find its Product to be 2637685, then I go to the next Figure in the Multiplier, *viz.* 8, and multiply all the Figures in the Multiplicand by that alſo; and find the Product 4220296, then I multiply the Multiplicand by the laſt Figure, *viz.* 2, and the Product of that is 1055074. Then drawing a Line under theſe Products, I add them together, and find their Total to be 150348045, for the true Product ſought: That is, I find that 285 times 527537 amounts to 150348045; as by the Work above may be ſeen.

VIII. Whenever the Multiplier is ſuch a Number, that any two Numbers of the Multiplication-Table being multiplied together, make the ſaid Multiplier; as in the foregoing Page, where the Multiplier is 24, and is made by multiplying 6 and 4 together; then if you multiply the Multiplicand by either of thoſe Numbers, that is, either 6 or 4, and then multiply that Product by the other Number, the laſt Product ſhall be the Anſwer, and the ſame with the other Way.

Example.

365 Multiplied
By 4
1460
6
8760 Product agreeable to the 1ſt *Example.*
And ſo of any other.

There are, ſometimes, Figures ſaved by this Method; and there is no Addition of Products.

More Examples.

4766
14
19064
4766
66724

6726
17
47082
6726
114342

476
19
4284
476
9044

56071592
123
168214776
112143184
56071592
6896805816

275827
19725
1379135
551654
1930789
2482443
275827
5440687575

How

How to prove Multiplication by the Croſs.

The common Way uſed in *Schools* is this: They make a *Croſs* thus, X, then add all the Figures in the Multiplicand together, as in *Addition*, and caſt away the Nines, as oft as they ariſe, and bear the Remainder to the next Figure; when they come to the End of the Line, they note what remains after the Nines are caſt away, and ſet ſuch Remainder on the Left-ſide of the *Croſs*; then they do the ſame by the Multiplier, and note what remains there alſo, ſetting that on the Right of the *Croſs*; then they multiply them two Figures together, and caſt the Nines out of that Product, ſetting the Remainder on the Top of the *Croſs*: Laſtly, they caſt away the Nines out of that Product, and if the Remainder be like the Figure on the Top of the *Croſs*, they ſet it down at the Bottom, and conclude the Work right.

But this way of Proof is not infallible, as I have experienced many times: But this may be ſaid for it, that if a Sum be done right, it will never appear wrong by this Way; but it many times makes a Sum appear right when it is utterly falſe; and therefore is not to be depended on as a certain *Proof*. I'll give one *Example*, to make the foregoing Directions the more intelligible; which ſhall be one of the preceding Sums ſet down again here, *viz.* the Second foregoing.

3	56071592	*Multiplicand*
X 6	123	*Multiplier*
3	6896805816	*Product.*

Here, after having made the *Croſs*, thus: **X**
I begin at the Multiplicand, it's no matter at which End; but I'll begin towards the Left-hand, ſaying, 5 and 6 is 11, I caſt away 9, and there reſts 2, and 2 and 7 is 9, and there reſts nothing; then 1 and 5 is 6 (I miſs the 9) and 2 is 8, which I ſet on the left of the *Croſs*, as it appears in the *Margin*.

8 X 6

3
8 X 6
3

Then going to the Multiplier, I ſay, 1 and 2 is 3, and 3 is 6, which I place on the Right. Then multiply one by the other, ſaying, 8 times 6 is 48, I caſt away 5 Nines out of it, and there remains 3, which I put to the Top, as you ſee in the Margin. After the ſame Manner I caſt away the Nines out of the Product, and at the laſt there remains 3 likewiſe, and ſo the Work is done.

Note, *That the Figures on each Side of the* Croſs, *being multiplied, make* 48, *and if you add thoſe two Figures together, as they ſtand, and caſt away the Nines, the Remainder will be the ſame; thus inſtead of ſaying, how many Nines in* 48; *you ſay* 8 *and* 4 *is* 12; *the Nines in* 12 *once, and there remains* 3, *as before.*

IX. The greateſt Difficulty in Multiplication, is, when there is a Cypher or Cyphers, intermixt with the Figures. In ſuch Caſes, only remember what was ſaid before, in the VIIth *Rule*, to move for every Figure, or Cypher, one Place toward the Left-hand, and to take care that each firſt Figure of the ſeveral Products ſtand directly under its reſpective Multiplier; an *Example* will make it eaſy to be underſtood.

Let it be required to multiply 50710984, by 4050607, having ſet the Numbers down as before directed, with a Line under them, they ſtand thus:

50710984 *Multiplicand.*
4050607 *Multiplier.*

354976888
3042659040
2535549200
2028439360

205410266767288

Here I begin, ſaying 7 times 4 is 28, &c. and ſo go hro' the Multiplicand by 7, and find its Product 54976888; then I come to a Cypher, which I ſet down nder the ſecond Figure of the above-mention'd Pro- uct, *viz.* 8, then I multiply the Multiplicand by the ext Figure of the Multiplier, *viz.* (6 in the ſame Line) ying 6 times 4 is 24: I ſet down four next to the Cy- her, in the ſame Line, and it ſtands under the third igure in the laſt Product, juſt under its Multiplier 6, d I find this Product or Line, to be 3042659040. hen coming to another Cypher, I ſet it down juſt un- er its own Place, and go forward with the next Figure, , in the ſame Line as before, ſaying, 5 times 4 is 20, c. I ſet down the 0, juſt under 5 the Multiplier, and nd the Product to be 2535549200. Then I come to nother Cypher, and proceed as before, and find this ſt Line, or Product, 2028439360. All which Products eing added together, make 205410266767288, for nſwer. See the foregoing Work.

More Examples.

```
    7864371
      20604
-----------
   31457484
  471862260
 157287420
-----------
162037500084
-----------
```

```
    327588
      6030
----------
   9827580
  19655160
----------
1975343580
----------
```

X. When there is a Cypher, or Cyphers, in the Mul- plier towards the Right-hand, then ſet it, or them, ackward from the Place of Units, towards the Right- and, and multiply by the ſignificant Figure, or Figures, s uſual; and afterwards annex the Cypher, or Cyphers, the general Product on the Right-hand, as in the fol- owing *Examples.*

Examples.

325
20
6520

4762
70
333340

4796
400
1918400

746094
3600
4476564
2238282
2685938400

72964
476000
437784
510748
291856
34730864000

XI. When there are Cyphers both in the Multiplicand and Multiplier, then omit the Cyphers in both, till you have multiplied by the significant Figures; and then join the Cyphers in each to the Product; as in these

Examples.

42600
220
852
852
9372000

423000
5600
2538
2115
2368800000

376400
2400
15056
7528
903360000

CONTRACTIONS,

Or, how to multiply by 10, 100, 1000, 10000, *&c.*

To multiply by	Add to the Multiplicand
10	0
100	00
1000	000
10000	0000
100000	00000

Example.

428 Multiplied by		makes	
	10		4280
	100		42800
	1000		428000
	10000		4280000
	100000		42800000

If you would be expeditious and dextrous in *Accompts*, lways ſo multiply by 11 and 12, that the Product may e in one Line only.

Examples.

ultiply	456	7890	3425
y	11	11	11
roduct	5016	86790	37675

In the firſt of theſe, I ſay, 11 times 6 is 66, 6 and go 6: and 11 times 5 is 55, and 6 is 61, 1 and go 6; and 1 times 4 is 44, and 6 is 50, as above; and ſo of the reſt.

ultiply	1234	56789	30762
y	12	12	12
roduct	14808	681468	369144

Here I ſay, 12 times 4 is 48, 8 and carry 4; and 12 imes 3 is 36, and 4 is 40, 0 and go 4, &c.

hen any Number is to be multiplied by 5, it may be contracted by annexing a Cypher to the Number, and then halve it, becauſe 5 is the Half of 10.

And the Rule holds good for Brevity if a Number is to e multiplied by 15. *Example*, Multiply 567 by 15.

5670

½ 2835
By 3 becauſe 3 times 5 is 15.

8505

When you multiply by any of theſe compound Numbers, *viz.* 110, 120, 1100, or 1200, then multiply as before, and annex the Cyphers afterwards.

Example.

Mult.	3762	34567	46972	96726
By	110	120	1100	1200
Prod.	413820	4148040	51669200	116071200

Which Way of multiplying is much better than the following.

3762	Or thus,	34567
110		120
37620		691340
3762		34567
413820		4148040

XII. To multiply by Article Numbers, *viz.* 13, 14, 15, &c. to 20, to have the Work in one Line.

Examples.

74974	45678
13	18
974662	822204

Or Thus,

74974	45678
224922	365424
974662	822204

RULE.

RULE for the firſt two Examples.

Multiply each Figure in the Multiplicand by the Unit Figure in the Multiplier, adding to each ſingle Product its back Figure; and to the laſt Figure add what you carry.

As in the firſt Example, I ſay, 3 times 4 is 12, 2 and go 1; and 3 times 7 is 21, and 1 carried is 22, and 4, the back Figure of the Multiplicand, is 26, 6 and go 2; and 3 times 9 is 27, and 2 is 29, and 7, the back Figure, is 36, 6 and go 3; and 3 times 4 is 12, and 3 is 15, and 9, the back Figure, makes 24, 4 and carry 2; then 3 times 7 is 21, and 2 is 23, and 4, the back Figure, is 27, 7 and go 2, which 2 add to the laſt Figure 7, and it makes 9, as in the Work.

In the two laſt Examples, I multiply by the laſt Unit Figure of the Multiplier, and ſet the firſt Figure of the Product one Place forward to the Right-hand.

XIII. To multiply by a *mixt Number*; that is a *Whole Number* joined with a *Fraction*, whether it be $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{3}$, or $\frac{1}{5}$.

The RULE.

When you have multiply'd by the whole Number, take the $\frac{1}{4}$, the $\frac{1}{2}$, the $\frac{3}{4}$, the $\frac{1}{3}$, or the $\frac{1}{5}$, of the Multiplicand, and add it to the Product, and that Total ſhall be the whole Product, as in the following *Examples.*

Example 1.

In 276 Barrels of *Raiſins*,
Each $3\frac{1}{4}$C. How many Hundred Weight?

828 the Product by 3.
69 the 4th Part of the Multiplicand, 276.

Anſw. 897 Hundreds Weight in all.

Example 2.

In 756 Pieces of *Stuffs*,
Each $24\frac{1}{2}$ Yards, How many Yards?

3024
1512
378 The Half of the *Multiplicand*, 756.

Anſw. 18522 Yards in all.

Example 3.

In 63 Fodder of *Lead*,
Each $19\frac{1}{2}$C. How many Hundreds?

567
63
$31\frac{1}{2}$ the Half of 63, the *Multiplicand*.

Anſw. $1228\frac{1}{2}$ Hundreds Weight in all.

If the Multiplier had been accounted Money, or 19*s*. 6*d*. and the Multiplicand 63 Integers, at that Price, then the Product would have been 1228*s*. 6*d*. or 61*l*. 8*s*. 6*d*.

Example 4.

In 24 Caſks of *Tobacco*,
Each $2\frac{3}{4}$C. How many Hundreds?

48
12 The Half of 24.
6 The 4th Part of 24, or Half of 12.

Anſw. 66 Hundreds in all.

'Twould have been the ſame, if I had ſaid 24 *pr.* of *Stockings*, or any thing elſe, at 2*s*. $\frac{3}{4}$, or 2*s*. 9*d*. (for 9*d*. is $\frac{3}{4}$ of a *Shilling*) then the Product would have been 66*s*. or 3*l*. 6*s*.

Example 5.

224 *French* Crowns,
At $54\frac{1}{3}$ *per* Crown.

896
1120
$74\frac{2}{3}$ The $\frac{1}{3}$ of 224, the *Multiplicand.*
Pence $12170\frac{2}{3}$

Example 6.

340 Groſs of *Paſte-boards*,
At $7\frac{1}{5}$*d. per* Groſs, Cuſtom.

2380
68 The $\frac{1}{5}$ Part of 340.

Prod. 2448 *Pence.*

This Method of multiplying by a mixt Number, is of excellent Uſe in a Multitude of Caſes, particularly in Exchange of Money of different Nations.

XIV. I ſhall now ſhew the excellent Uſe of *Multiplication*, in anſwering all manner of Queſtions, that ordinarily occur in Buſineſs; where we have the *Price of one Thing*, and want to know the *Value* of *many Things* at that Rate; and ſhew that it performs the *Office*, and anſwers the *Work* of Queſtions in the *Rule of Three Direct*, of that Kind; but in a much conciſer Method, and more elegant Manner; and that by ſuch eaſy Rules and Directions, that any one, who underſtands *Addition of Money*, ſhall as readily caſt up any thing this Way, as he ſhall in a Sum in that: For nothing is more required here, than to carry from one Denomination to the next, exactly as we do there; and therefore it may be truly ſaid, That this *Rule* performeth the Work of many *Additions*, as was hinted before.

Example.

How much is 3 times
Or 3 Yards of Cloth, at
11*s.* 9*d.*

		s.	*d.*	
		11	9	*Multiplicand.*
			3	*Multiplier.*
l.	1	15	3	*Pro.* or *Anſw.*

The RULE.

Obſerve always to multiply the *Price* by the *Quantity*, and the *Product* is the *Anſwer*.

Here I ſay, 3 times 9 is 27 Pence, which is 2*s.* and 3*d.* I ſet down 3 under the Place of Pence, and carry the 2*s.* to the Shillings; then 3 times 11 is 33, and 2 that I carry is 35*s.* which is 1*l.* 15*s.* I ſet down the 15*s.* under the Shillings Place, and ſet down the 1*l.* a little forward to the Left-hand; and ſo the Queſtion is anſwered, and found to amount to 1*l.* 15*s.* 3*d.* as by the Work above. Now here is no more Difficulty than in *Addition*, it being the ſame in effect, and altogether as eaſy.

	s.	*d.*
	11	9
	11	9
	11	9
1	15	3

If 11*s.* 9*d.* is three times ſet down as in *Addition*, and caſt up, it will prove the ſame, as may be ſeen in the *Margin*; and is a ſure Proof of the Truth of this Method.

Example 2.

How much is 5 times 7*s.* 4*d?* or 5 Gallons of *Brandy*, at 7*s.* 4*d.*

		s.	*d.*	
Multiplicand,		7	4	The Price.
Multiplier,			5	The Quantity.
Product,	1	16	8	Anſwer.

Here I ſay, 5 times 4 is 20 Pence, which is 1*s*. 8*d*. I ſet down 8 and carry 1, juſt as in *Addition of Money*, (and nothing more is required to be remembred, let the *Example* be what it will) and 5 times 7 is 35*s*. and 1 I carried is 36*s*. which is 1*l*. 16*s*. I ſet down the 16*s*. under the Place of Shillings, and the 1*l*. towards the Left-hand, and the *Anſwer* is 1*l*. 16*s*. 8*d*. as above.

Example 3.

What is 7 times 21*d*? Or 7 Stone of *Beef*.

	s.	*d.*	
At —— ——	1	9	Price.
		7	
	12	3	

Here I ſay, 7 times 9 is 63*d*. that is 5*s*. 3*d*. ſet down 3, and carry 5, and 7 times 1 is 7, and 5 is 12; which makes 12*s*. 3*d*. for the Anſwer.

Example 4.

What comes 9*lb*. of Tea to, at 9*s*. 9*d* ½ *per* Pound?

l.	*s.*	*d.*	*qr.*
	9	9	½
			9
4	8	1	½

I ſay here, 9 times 2 is 18, 18 Farthings is 4*d*. ½; ſet down ½, and carry 4; then 9 times 9 is 81, and 4 I carried is 85 Pence, which is 7*s*. 1*d*. I ſet down 1, and carry 7; then 9 times 9 is 81, and 7 is 88 Shillings, which make 4*l*. 8*s*. I ſet down 8*s*. and the 4*l*. out to the Left-hand, as before; and the *Anſwer* is 4*l*. 8*s*. 1*d*. ½, as above.

Example 5.

	l.	*s.*	*d.*
What comes 10 times — —		11	6 to ?
Or, 10*lb.* of *Nutmegs* at 11*s.* 6*d.* —			10
	5	15	0

Here 10 times 6 is 60 Pence, which is juſt 5*s.* I ſet down 0, and carry 5, then 10 times 11 is 110, and 5 is 115 Shillings, which is 5*l.* 15*s.* for the *Anſwer.*

Example 6.

How much is 11 times, — —		17	6
Or, 11 *Piſtoles* at *ditto?* — — —			11
	l. 9	12	6

I ſay here, 11 times 6 is 66 Pence, which is 5*s.* 6*d.* I ſet down 6 and carry 5; then 11 times 7 is 77, and 5 that I carry is 82, I ſet down 2, and carry 8; then 11 times 1 is 11, and 8 is 19; and as they are ſo many *Angels* (it being in the Tens of Shillings) I take the half of them, which is 9 or 9 Pounds, and Ten Shillings over, which I put to the Left of the 2*s.* ſet down before, and they make 12*s.* and the 9*l.* I ſet at a proper Diſtance towards the Left-hand, as in the *Example* may be ſeen.

Example 7.

		s.	*d.*
What comes 12 *Sheep* to, at —		13	4
			12
	l. 8	00	0 *Anſw.*

Note, *'Tis beſt to multiply the Shillings as ſimple Numbers, for every* 10 *carrying* 1, &c. *and then to halve the Tens of Shillings, which Half is always ſo many Pounds, and if they halve even, ſet down a Cypher in the Tens of Shillings Place; but if odd, then ſet down a* 1 *in that Place; Inſtances of both may be obſerved in the two laſt Sums.*

In the laſt Sum I ſaid, 12 times 4 is 48 Pence, or 4*s.* I ſet down 0, and carry 4; then 3 times 12 is 36, and 4 is 40; I ſet down 0, and carry 4 for 4 Tens; then 12 times 1 is 12, and 4 is 16, the Half of 16 is 8, which is 8 Pounds for *Anſwer*, as in the Work.

Some more Examples.

	l.	*s.*	*d.*
9*lb.* of *Cinnamon*, at — — — —		7	2
			9
Anſw.	3	04	6
8 *C.* of *Sugar*, at — — — —		44	4
			8
Here the ½ of 35 is 17 and a ½ —	17	14	8
12 Pairs of *Stockings*, at 9*s.* 8*d.* *per Pair*,		9	8
			12
	5	16	0
7 *C.* of *Hops*, at — — — —	3	6	9
			7
Anſw.	23	07	3

	l.	*s.*	*d.*	*q.*
11 Ounces of *Silver*, at — — —	0	5	5	½
				11
Anſw.	3	0	0	½
10 Pipes of *Wine*, at *per Pipe* ——	24	15	0	
			10	
Anſw.	247	10	0	
6 Yards of *Flannel*, at — — —		1	2	
			6	
Anſw.		7	0	
9 C. of *Tallow*, at — — —		34	6	
			9	
Here the ½ of 31 is 15 and a ½ —	15	10	6	

XV. When the Quantity exceeds 12, find two Numbers in the *Multiplication-Table*, which being multiplied together, will make the Quantity; then multiply the *Price* by one of the Numbers (it matters not which you multiply firſt by) and then that Product by the other Number, and the laſt Product will be the *Anſwer*.

Example 1.

What is 18 Times Gallons of Brandy, at 4*s*. 6*d*. *per* Gallon.

		4	6	Or 18
			3	the 1ſt Multiplier.
		13	6	the 1ſt Product by 3.
			6	the 2d Multiplier.
Anſw.	4	01	0	the laſt Product by 6.

Here I find this Quantity two Ways (as many times it happens, *viz.* either by 3 and by 6, or by 2 and by 9; either of them multiplied together make the Quantity, *viz.* 18.

l.	*s.*	*d.*
	4	6
		2
	9	0
		9
4	1	0

Here is the Anſwer produced by 2 and 9, as above.

Example 2.

How much is 32 times		15	9½
Or, 32*lb.* of *Tea*, at 15*s.*			4
9*d.* ½ *per* Pound.			
The firſt Product by 4.	3	03	2
The ſecond Multiplier			8
Anſwer	25	05	4

Here the Numbers are 4 and 8; 4 times 8 making 32, the Quantity; wherefore I begin, and ſay, 4 times 2 is 8 Farthings, which being juſt Two-pence, I carry it to the Pence; then 4 times 9 is 36, and 2 is 38 *Pence*, which is 3*s.* and 2*d.* I ſet down 2 and carry 3*s.* &*c.* After I have multiplied by 4, I find that Product to be 3*l.* 3*s.* 2*d.* which I multiply by 8, the other Number, and find the laſt Product, or Anſwer, to be 25*l.* 5*s.* 4*d.* as in the Work may be ſeen.

What is 120 times,
Or, 120 Quarters of
Corn, at 19*s.* 8*d.* *per*
Quarter ?

	l.	*s.*	*d.*
		19	8
			10
	9	16	8
			12
Anſw.	118	00	0

Here 10 times 12 makes 120 the Quantity ; wherefore I multiply firſt by 10, and that Product is 9*l.* 16*s.* 8*d.* which I multiply by the other Number 12, and that produces 118*l.* for the Anſwer.

77 C. of *Madder*, at — — —

	l.	*s.*	*d.*
	3	15	6
			7
	26	08	6
			11
Anſw.	290	13	6

Here 11 times 7 makes the Quantity ; when I come to multiply by the ſecond Multiplier, *viz.* 11, I ſay, 11 times 6 is 66, which is 5*s.* 6*d.* I ſet down 6, and carry 5 ; then 11 times 8 is 88, and 5 is 93*s.* which is 4*l.* 13*s.* I ſet down 13 and carry 4; and then 11 times 6 is 66, and 4 is 70, I ſet down 0, and carry 7 for the Tens ; and then 11 times 2 is 22, and 7 is 29, &*c.*

More Examples.

15 Yards of *Ribbon*, at — — —

		2	1
			3
		6	3
Here 3 times 5 is 15, the Quantity			5
Anſw.	1	11	3

		l.	s.	d.
21 Yards of *Tabby*, at — — —			5	11
				7
Here 7 times 3 is 21		2	01	5
				3
	Anſw.	6	04	3

		l.	s.	d.
72 Gallons of *Wine*, at — —			5	4
				6
Here 6 times 12 makes the Quantity, or 8 times 9 makes 72 likewiſe.		1	12	0
				12
	Anſw.	19	04	0

		l.	s.	d. q.
81 *lb.* of *Nutmegs*, at — —			12	3 $\frac{3}{4}$
				9
Here 9 times 9 makes the Quantity.		5	10	9 $\frac{3}{4}$
				9
	Anſw.	49	17	3 $\frac{3}{4}$

XVI. When the Quantity is ſuch a Number, that no two Numbers in the Table can be found to anſwer t, then multiply by two ſuch Numbers as come neareſt o the Number given, as before; and for the Number wanting to make up the Number given, multiply the Price of one by the Number that is wanting, and add t to the other Product, and the Total will be the Anſwer.

Example 1.

	l.	*s.*	*d.*
39 C. of *Currants*, at *per C.* — —	2	13	6
			6
	16	01	0
			6
	96	06	0
The Price 2*l.* 13*s.* 6*d.* multiplied by 3.	8	00	6
Anſw.	104	06	6

Here I find the two Numbers that come the neareſt are 6 times 6, by which I multiply as before, and the laſt Product is 96*l.* 6*s.* 0*d.* but 6 times 6 is but 36, and the Quantity is 39, ſo that there is 3 *C.* wanting; wherefore I multiply the Price 2*l.* 13*s.* 6*d.* by 3, and it produces 8*l.* 00*s.* 6*d.* to be added to the laſt Product 96*l.* 06*s.* 0*d.* which together makes 104*l.* 06*s.* 6*d.* for the Anſwer.

	l.	*s.*
79 Firkins of *Butter*, at — — —	00	17
	6	02
Here the two Numbers that come neareſt, are 7 times 11, which is 77.	67	07
The Price multiplied by (2) that are wanting.	01	15
Anſw.	69	02

More Examples.

57 Groſs of *Pipes*, at *per* Groſs — —		1	4	
			7	
		09	4	
			8	
	03	14	8	
1 Groſs wanting.	00	01	4	
Anſw.	03	16	0	

	l.	*s.*	*d.*	*q.*
76 *C.* ¾ of *Ship-Biſket*, at — — —		13	6	
			6	
	4	01	0	
			12	
	48	12	0	
The Price multiplied by 4	02	14	0	
The ½ 13*s.* 6*d.* for the ½ *C.*	00	6	9	
The ¼ of ditto for the ¼ *C.*	00	3	4	½
Anſw.	51	16	1	½

87 Ells of *Holland*, at — —		3	5	½
Here 7 times 12 is 84, and 3 is 87			7	
	1	04	2	½
			12	
	14	10	6	
The Price multiplied by 3.		10	4	½
Anſw.	15	00	10	½

If I had multiplied by 11 times 8, which is 88, and ſubtracted the Price of 1 from the Product, the Remainder would have been the Anſwer, as before.

	l.	s.	d.
97 *C.* $\frac{1}{2}$ of *Cheeſe*, at *per C.* — —		25	6
			8
	10	04	0
			12
	122	08	0
For the 1 *C.* wanting	1	05	6
The Half of the Price for the $\frac{1}{2}$ *C.*		12	9
Anſw.	124	06	3

Thus by the various *Examples* foregoing, is manifeſtly ſeen, that when the Price of one thing is given, the Price of many (at the ſame Rate) may be found by *Multiplication* only; and ſooner, and much handſomer than by the *Rule of Three.*

Large Sums may be caſt up this Way, as well as ſmall, obſerving the Directions following.

When your Sum is 1, 2, 3, 4, or more Hundreds, always multiply the Price by 10, and then that Product by 10 alſo, which produces the Value of one Hundred; then multiply that Product by the Number of Hundreds, whether 2, 3, 4, or 5, *&c.* and that Product is the Value of ſo many Hundreds as there are; then for the Tens, whether 20, 30, 40, *&c.* multiply that Product which gives the Price of 10, either by 2, 3, 4, or 5, as the Tens ſhall happen, which place under the laſt Product, without drawing a Line; and for the Units always multiply the Price by them, whether 2, 3, 4, *&c.* and ſet that alſo juſt under the former Products ſo that you will have three Lines to add together, and the Total of them is always the Anſwer. An *Example*, or two, will make it eaſy to be underſtood.

Example 1.

	l.	*s.*	*d.*	
What is 648 times		4	6	
Or 648 *lb.* of *Indigo*, at *ditto?*			10	
The Value of (10)	2	05	0	
			10	
The Value of (100)	22	10	0	
The Number of Hundreds			6	
The Value of (600)	135	00	0	600
The Price of (10) mult. by (4)	9	00	0	40
The Price multiplied by (8)	1	16	0	8
Anſw.	145	16	0	648

Firſt I multiply 4*s.* 6*d.* the Price by 10, and that produces 2*l.* 5*s.* for the Price of 10; alſo I multiply the ſaid 2*l.* 5*s.* the Price of 10, by 10 again, and that produces 22*l.* 10*s.* for the Value of 100, then I multiply the Value of 100 by 6, the Number of Hundreds, and that Product is the Value of 600, being 135 *l.* 00*s.* 00 *d.* wherefore I am only now to find out the Value of 48: For the 4 Tens in 48, I multiply the Price of 10, *viz.* *l.* 2 : 05 : 0, by 4, and that Product ſhews the Value of 40, which is 9 *l.* Then for the 8 Units in the 48, I multiply the firſt Price, *viz.* 4*s.* 6*d.* and that Product gives the Value of 8, which is 1*l.* 16*s.* All which being added together, (that is only the three Lines that have no Line of Separation between them) make 145 *l.* 16 *s.* 0 *d.* for Anſwer.

And thus may any Sum be done, let it be as large as it will, only when the Sum conſiſts of Thouſands, you have 4 Lines to add together; but when but of Hundreds, only three.

Example 2.

355 Ells of *Holland*, at — —		2	3 ½	
			10	
The Value of (10)	1	02	11	
			10	
The Value of (100)	11	09	2	
			3	
The Value of (300)	34	07	6	300
The Value of 10 mult. by (5)	5	14	7	50
The Price by 5 Units	0	11	5 ½	5
Anſw.	40	13	6 ½	355

Example 3.

	l.	*s.*	*d.*	
966 *lb.* Pounds of *Bohea Tea*, at	—	14	5	
			10	
The Value of (10)	7	04	2	
			10	
Ditto of (100)	72	01	8	
The Number of Hundreds			9	
The Value of (900)	648	15	0	900
The Value of 10 mult. by (6)	43	05	0	60
The Price of 1 mult. by (6)	4	06	6	6
Anſw.	696	06	6	966

Example 4.

	l.	*s.*	*d.*	
8954 Gall. of *Rum*, at — —		03	5	
			10	
The Price of (10)	1	14	2	
			10	
	17	01	8	
			10	
The Price of (1000)	170	16	8	
The Number of Thouſands			8	
The Value of (8000)	1366	13	4	8000
The Value of (100) mult. by 9,	153	15	0	900
The Value of (10) mult. by 5,	8	10	10	50
The Price mult. by 4 Units,	0	13	8	4
Anſw.	1529	12	10	8954

I have inſiſted the longer on this excellent Method, that it might be well underſtood; not only for its elegant, expeditious, and facile Diſpatch of ordinary Affairs; but for its Utility in contracting many Operations in other Rules, as the *Rule of Three*, &c.

I know it is not cuſtomary to introduce any thing of this Kind to be learnt ſo early; imagining (it may be) the Scholar not capable of underſtanding them, 'till he has made farther Advances in *Arithmetic*; but ſince they are only *Multiplication*, the foregoing Methods properly belong to the *Rule*, and may well be taught in it, eſpecially ſince they are of ſuch excellent Uſe in all manner of Buſineſs, and may be of Service to ſome, whoſe Leiſure or Ability admit not of larger Improvements in *Arithmetic*.

Quantities of Weight, Meaſure, *&c.* are expeditiouſly found by this Method of multiplying by component Parts.

Examples.

In 64 Barrels of *Anchovies*, each $30\frac{1}{2}$
how many Pounds? Multiply by 8 and 8

Anſw. 1952

In 56 Firkins of *Butter*, each 56 *lb.*
how many Pounds? Multiply by 7 and 8

Anſw. 3136

	C.	*qrs.*	*lb.*
In 98 Caſks of *Capers*, each	3	3	14
how many Hundreds, *&c?*		10,	9, and 8
Anſw.	379	3	0

In 104 Bars of *Spaniſh Silver*, each $46\frac{1}{4}$ *oz.*
How many *Oz.* 10, 10 and 4

Anſw. 4810 Ounces.

In 48 Packs of *Linen*, each 4225 Ells *Flem.*
how many Ells *Flemiſh?* Mult. by 6 and 8

Anſw. 202800

I might here alſo ſhew the Method of *Croſs Multiplication*; or multiplying *Shillings* and *Pence*, by *Shillings* and *Pence*; or *Feet* and *Inches*, by *Feet* and *Inches* (it being all one) and ſome other Methods in *Practical Multiplication*; but there being too much of *Diviſion* uſed with them, I ſhall defer them till I come to another Place.

CHAP.

CHAP. V.

DIVISION

I. IS a *Rule* by which we diſcover how often one Number is contained in another; as if it were aſked, How often is 8 contained in 48, the Anſwer would be 6 times. It likewiſe ſerveth to bring ſmall Denominations into greater; as *Farthings* into *Pounds*, and *Pounds Weight* into *Tuns Weight*, &c.

II. This *Rule* is comprehended under Three certain Branches, and One uncertain, *viz.*

1. The *Dividend*, or Number given to be divided.
2. The *Diviſor*, or Number given to divide by.
3. The *Quotient* or Number of equal Parts, ſhewing how often the *Diviſor* is contained in the *Dividend*.
4. The *Remainder*, after the Work is ended; which is always of the ſame Name or Quality with the *Dividend*; and muſt be leſs than the *Diviſor*, if the Work be right: And this is the uncertain Branch, becauſe there is ſometimes a *Remainder*, and ſometimes not.

III. *Diviſion* is either Single or Compound. Single, when the *Diviſor* conſiſteth of one Figure only, and the *Dividend* of two at the leaſt. Any thing of this Kind is anſwered by the *Multiplication-Table*; as if 54 were to be divided by 6, the Anſwer would be 9; for 6 is contained 9 times in 54: Here 54 is the *Dividend*; 6 the *Diviſor*; and 9 is the *Quotient*, or Anſwer.

IV. *Compound Diviſion*, is when the *Dividend* conſiſteth of many Places or Figures, and the *Diviſor* of one or more Figures. As if 365, the Days in a Year, were to be divided by 7, the Days in a Week; 365 is the *Dividend*; 7 the *Diviſor*; 52 the *Quotient*, and 1 the *Remainder*.

Dividend
Diviſor 7)365(52 *Quotient.*
35
—
15
14
—
1 *Remainder.*

A General RULE for the Working.

N. B. { 1 *Seek*,
2 *Multiply*,
3 *Subtract*. }

This *Rule* comprehends Three of thoſe foregoing; and is accounted the hardeſt Leſſon of *Arithmetic*; but I ſhall, by plain *Rules*, and familiar *Examples*, render it eaſy to the meaneſt Capacity. And, as in *Multiplication*, ſo in this *Rule*, I ſhall endeavour at ſome new Improvements; diſcovering that many Things in this *Rule* may be abridged, and ſhew its excellent Uſe in anſwering many Queſtions, which ſeem to require a more progreſſive Knowledge in *Arithmetic*.

Example 1.

Let it be required to divide 7420 by 5; in order to which, I place my *Dividend*, or Sum to be divided, into 5 equal Parts, or Shares, thus 7 4 2 0. Then I place my *Diviſor* 5, before the *Dividend*, with a crooked Line before it, and a ſtraight Line drawn underneath it thus.

5)7420
———

Then I proceed according to the *Rule:* And firſt I *ſeek*, ſaying, How many times 5, the *Diviſor*, can I have in 7, the firſt Figure of the *Dividend*, and the Anſwer is once, which 1 I place under the Line, juſt under the 7; then according to the *Rule*, I multiply, ſaying, once 5 (the *Diviſor*) is 5; then as the Rule directs, I ſubtract, ſaying, 5 from 7, and there remains 2, which are two Tens, which I ſuppoſe to ſtand before the next Figure in the *Dividend*, viz. 4, and ſo makes it 24.

5)7420

1

for a new *Dividend*. Then again I *ſeek*, ſaying, How many times 5; (the *Diviſor*,) can I have in 24, the *Dividual?* And the Anſwer is 4 times, which I place under the Line, juſt under 4 the ſecond Figure, in the *Dividend*, then I multiply, ſaying, 4 times 5 the *Diviſor*, is 20, which I ſubtract from 24, and there reſts 4, which being 4 Tens, makes the next Figure 2, in the *Dividend*, to be 42. Then again I ſeek how many times 5 I can have in 42, and the Anſwer is 8 times, which I put under tbe Line, juſt under 2, the third Figure in the *Dividend*; then I multiply, ſaying, 8 times 5 is 40, which I ſubtract from 42, and there remains 2, which two Tens make the Cypher in the *Dividend*, to be 20, then I ſay how many times 5, the *Diviſor*, in 20, and the Anſwer is 4 times; then 4 times 5 (the *Diviſor*,) is 20, from 20, and there remains nothing. And ſo the Work is done; as by the following *Example*.

Diviſor 5)7420(*Dividend*

1484 *Quotient*, or Anſwer.

So that I find by the Work, that 5 is contained in 7420, juſt 1484 times: Or if the *Dividend* had been ſo many *Shillings* or *Pounds*, to be parted among 5 Perſons, each Perſon muſt have had ſo many *Shillings* or *Pounds*, for his Share.

V. When the Figure of your *Dividend* is leſſer than the *Diviſor*, or firſt Figure of your *Diviſor*, then make the two firſt Figures of the *Dividend*, your *Dividual*, and work as before.

Example.

Divide 4263 Gallons of *Wine* among ſeven Perſons: Having ſet down the *Dividend* for the Work as before, with the *Diviſor* before it, thus,

7)4263(Dividend.

---

609 Quotient.

I proceed, ſaying, How many times 7, (the *Diviſor*,) can I have in 4, the firſt Figure of the *Dividend*; and knowing I cannot take 7 out of 4, I take it out of 42, the two firſt Figures of the *Dividend*; and the Anſwer is 6 times, which I put juſt under 2, the ſecond Figure of the *Dividend*, and then multiply, ſaying, 6 times 7, (the *Diviſor*) is 42, from 42, and there remains nothing. Then the Sevens that are in 6 (for you muſt never take more than one Figure or Cypher, at a time, out of the *Dividend*, except you are obliged to do it at firſt) I cannot take, wherefore I put a Cypher in the *Quotient*, under 6, and 6 remains as ſo many Tens, and makes the next or laſt Figure in the *Dividend* 3, to be 63; then the Sevens in 63, 9 times, and the Work is done; and the *Quotient* is 609, or 609 Gallons for each Man's Share.

The P R O O F.

To prove this, or any other Sum in *Diviſion*, multiply the *Quotient* by the *Diviſor*, and if the *Product* is like the *Dividend*, the Work is right: But obſerve, whenever there is a *Remainder*, ſuch *Remainder* muſt be taken in, or added to the *Product*.

Example.

7)4263

609
7

4263 *Proof.*

Here I ſay, 7 times 9 is 63, 3 and carry 6, then 7 imes 0 is nothing, but 6 is 6; laſtly, 7 times 6 is 42; o that I find this *Product* to be the very ſame Figures ith the *Dividend*; therefore the Work is right.

So likewiſe, as *Multiplication* proves *Diviſion*, doth *iviſion* prove *Multiplication*. For if you divide the *roduct* by the *Multiplier*, the *Quotient*, (if the Work is ght) will be the ſame with the *Multiplicand*. As thus:

In proving the laſt Sum, 609 is the *Multiplicand*, and 263 is the *Product*, and 7 the *Multiplier*. Now if the *roduct* 4264 be divided by 7 the *Multiplier*, the *Quoent* will be 609 the *Multiplicand*, as may be ſeen in e foregoing Work.

Example.

Divide 97961 Pieces of 8 among 9 Men.

9)97961

$10884\frac{5}{9}$ *Anſw.*

97961 *Proof.*

Here I ſay, the Nines in 9, once; which I put under the Line, juſt under 9 in the *Dividend*, and then I multiply, ſaying once 9 from 9, and there remains nothing; then the Nines in 7, none; wherefore I ſet down an 0 in the *Quotient*, juſt under 7, and the 7 remains, and makes the next Figure 9 in the *Dividend*, to be 79; then the Nines in 79, are 8; then 8 times 9 is 72, from 79, and there reſts 7, which makes the next Figure 6, in the *Dividend*, to be 76; then the Nines in 76 are are 8; 8 times 9 is 72, from 76, and there reſts 4, which makes the next and laſt Figure in the *Dividend* to be 41; then the Nines in 41 are 4; 4 times 9 is 36, from 41, and there reſts 5, which is the *Remainder*; and may be ſet at ſome ſmall Diſtance from the *Quotient*, towards the Right-hand, with the *Diviſor* 9 under it, thus $\frac{5}{9}$. So that there are 5 Parts of 9 over, beſides 10884, that comes to each Man's Share, and is called a *Fraction*, and ſignifies that each Perſon ought to have 5 Ninths of a *Piece of Eight* more to his Share.

What hath been already ſaid for Inſtruction, to divide by a ſingle Figure, I think ſufficient to any intelligent Perſon; and therefore ſhall only add ſome *Examples* for the Learner's Practice, and ſo proceed forward in the Rule.

Examples for Practice.

Diviſor	6)9654	7)4702	5)44044
Quotient	1609	$671\frac{5}{7}$	$8808\frac{4}{5}$ *Rem.*
	4)57802	9)345678	6)407060
	$14450\frac{2}{4}$	$38408\frac{6}{9}$	$67843\frac{2}{6}$

Diviſor

Diviſor	7)89012	8)98765	9)4567097
Quot.	12716	$12345\frac{5}{8}$	$507455\frac{2}{9}$
	7	8	9
Proof.	89012	98765	4567097

Note, *There can be no ſhorter Way, nor a more regular Method of dividing by a ſingle Figure, than by the* Examples *following.*

As in *Multiplication,* we multiply by 11 and 12 at nce, to have the Product in one Line, ſo in this Rule is moſt expeditious and commendable to divide by he abovementioned Numbers, as by a ſingle Figure, s in the following *Example.*

y	11)45678	11)379600
uotient	$4152\frac{6}{11}$	$34509\frac{1}{11}$

y	12)42697	12)3967040
uotient	$3558\frac{1}{12}$	$330586\frac{8}{12}$
	12	12
roof	42697	3967040

In the firſt *Example,* I ſay, the Elevens in 45, 4 mes; the Elevens in 16, once; the Elevens in 57, 5 mes; the Elevens in 28 twice, and there remains 6; d the *Quotient* is 4152; as by the *Example.*

In the third *Example,* where I divide by 12 I ſay, the welves in 42, 3 times; the Twelves in 66, 5 times; e Twelves in 97, 8 times, and there remains 1; d the *Quotient* is 3558; as by the *Example.*

In like manner you may divide by theſe Numbers, *viz.* 110, 120, or 1100, or 1200, *&c.* cutting off the Cypher or Cyphers, with a downright Stroke of the Pen; and alſo as many Figures, or Cyphers, towards the Right-hand, in the *Dividend*, which will be the Remainder, or Part of it, as in the following

Examples.

Divide by 11|0)8097|4 12|00)2880|00

Quotient $736\frac{14}{110}$ 240

Diviſor 110

Proof 80974

VI. *Contractions*, or how to divide by 10, 100, 1000, or 10000, *&c.* So many Cyphers as you have in your *Diviſor*, cut off with a Stroke ſo many Figures, or Cyphers, from your *Dividend*, from the Right-hand towards the Left; and the Work is done. The Figures on the Left-hand of the Stroke is the *Quotient*; and thoſe on the Right the *Remainder*; as in theſe *Examples.*

Q. R. *Q. R.* *Q. R.*

1|0)36|5 1|00)749|60 1|000)567|890

10 100 1000

Quot.

1|0900)7496|4600 Remains

VII. When the *Diviſor* conſiſts of ſeveral Figures, then ariſes the greateſt Difficulty in the Work of *Diviſion*; but I ſhall give ſuch plain Directions, which, if heedfully attended, and obſerved, will render it very eaſy.

Exampl

Example 1.

Let it be required to divide 78901 by 32. In order to the Work, I place the Numbers down with two crooked Lines, one behind the *Diviſor*, and the other before the *Quotient*; thus,

Divid. Quotient
Diviſor 32)78901(. . . . .

Then I ſet out as many Figures towards the Left-hand of the *Dividend*, as there are Places in the *Diviſor*, by making a *Point* under 8, as above; then remembring the *General Rule*, viz. to *Seek*, *Multiply* and *Subtract*, I begin ſaying, how many times 3, the firſt Figure of the *Diviſor*, can I have in 7, the firſt Figure in the *Dividend*, and the Anſwer is twice; wherefore I ſet down 2 in the *Quotient*, thus, 32)78901(2. Then according to Rule, I multiply the *Diviſor* 32, by 2, the times I take ſaying, twice 2 is 4, which I ſet down under 8 in the *Dividend*; then twice 3 is 6, which I place under 7 in the *Dividend*; then I draw a Line; and, according to the Rule, ſubtract 64 from 78, and there remains 14; as in the firſt Step of the Work may be ſeen, ſtanding thus:

32)78901(2
64
———
14

Then I make a *Point* under the next Figure, to wit, 9, and bring it down, ſetting it on the Right-hand of the *Remainder* 14; and then there is 149 for a new *Dividend*, and ſtands thus:

32)78901(2

· ·

64

149

Then again I ſeek how oft I can have 32, the *Diviſor*, in 149 the *Dividend*; but ſince that is too hard to reach by the Mind, there being one Figure more in the *Dividual* than in the *Diviſor* (for there never ought to be more than one) I ſeek how often I can have 3, the firſt Figure of the *Diviſor*, in 14, the two firſt Figures in the *Dividual*, and I find I can have 4 times; wherefore I put 4 in the *Quotient*, and multiply the *Diviſor* 32, by 4, the Figure placed in the *Quotient*, ſaying 4 times 2 is 8, which I ſet under 9; then 4 times 3 is 12, which I put under 14, and then ſubtract 128 from 149, and there remains 21; (*Note*, After any *Subtraction*, there muſt never remain ſo much as the *Diviſor*, for if there doth, you have made an Error, by taking a Time too little, which muſt be rectified, before you proceed any farther;) then I make a Point under the next Place in the *Dividend*, which is a Cypher, and bringing it down, ſet it on the Right of the Remainder 21, and it makes 210, for a *Dividend*; and after this ſecond Step, the Work ſtands thus:

32)78901(24

· · ·

64

149

128

210

Then again I ſeek how oft I can have 32 the *Diviſor* in 210, or how oft (becauſe there is one Figure more in the *Dividual*, than in the *Diviſor*) I can have 3, the firſt in the Diviſor, out of 21, the two firſt Figures in the Dividual, and the Anſwer is 7 times: But I muſt obſerve, not to take the firſt Figure any more times than I can the next. Wherefore I try if I can take all the Figures 7 times, by multiplying 32 the Diviſor, by 7, and note its Product on Paper, or in my Mind, only by obſerving the two laſt Figures, whether it be not too big to ſubtract from the Dividual, and I find it is, for I cannot take 224 (the Product of 32 by 7) out of 210 the Dividual, wherefore I take a time leſs, *viz.* but 6, and put that in the Quotient, and ſay, 6 times 2 is 12, 2 and carry 1, and 6 times 3 is 18, and 1 is 19, and then I have 192 to take out of 210, and there reſts 18. Then I make a Point under the laſt Figure of the Dividend, 1, and bring it down to the Remainder 18, and it makes 181, and the Work ſtands thus:

```
32)78901(245
   ....
   64
   ---
   149
   128
   ---
    210
    192
    ---
    181
```

Then I ſeek how often I can have 32, out of 181, or how often 3 in 18, and the Anſwer is 6 times; but on Trial I find it too much; and therefore I take but 5 times, and ſet 5 in the Quotient, and multiply the Diviſor 32 by 5, and find that Product is 160, to be ſubtracted from 181, and ſo the Work is finiſhed, and the Quotient is 2465, and the Remainder 21; which ſhews that 32 is contained in 78901, 2465 times, and 21 over. *See the Work.*

Dividend
Diviſor, 32)78901(2465 Quotient
. . . .
64
———
149
128
———
210
192
———
181
160
———
(21) *Remainder.*

Example 2.

Divide 16790 Days by 365.
Quotient.
365) 16790 (46 Years.
. .
1460
———
2190
2190
———
(0)

In the *Example* above, I find I cannot take the firſt Figure of the Diviſor out of the Dividend; wherefore I ſay, How oſt 3 in 16? Upon Trial, I find 5 times too much, wherefore I ſet down 4 in the Quotient, and ſay 4 times 5 is 20, I ſet down 0 under 9, in the Dividend, and carry 2, ſaying 4 times 6 is 24, and 2 is 26, 6 and carry 2; then 4 times 3 is 12, and 2 is 14; which Product of 1460, I ſubtract out of the Dividual 1679, and there remains 219, to which I ſet down the Cypher out of the Dividend, and it makes 2190 for a Dividual, &c. *See the Work above.*

Example

Example 3.

Divide 345678901 by 2345. In order to the Work, I ſet it down thus:

2345)345678901(

In this Sum are four Places in the Diviſor, wherefore I make a Point under the 4th Figure in the Dividend, *viz.* under 6, for my firſt Dividual; but if the firſt Figure in the Diviſor had been bigger than the firſt in the Dividend, then I muſt have made the Point under the 5th Figure in the Dividend, to wit, under the 7; and then have tried how oft the firſt Figure in the Diviſor could have been taken out of the two firſt Figures in the Dividend.

But to proceed, I firſt ſeek how oft I can have 2, the firſt Figure of the Diviſor, out of 3, the firſt of the Dividend, which is once, wherefore I put 1 in the Quotient, and multiply the Diviſor 2345 by 1, ſetting the Product juſt under the firſt Dividual, and ſubtract according to Rule, and then the Work ſtands thus:

2345)345678901(1
2345
―――
1111

Note, *You muſt never bring down more than one Figure or Cypher at a time out of the* Dividend, *and for every Figure or Cypher brought down, there muſt be a Figure or a Cypher put in the* Quotient.

Then I make a *Point* under the next Figure in the Dividend, *viz.* 7, and bring it down, placing it on the Right of the Remainder 1111, and then I have 11117 for a Dividual, which contains one Figure more than the Diviſor; wherefore I take the firſt Figure of the Diviſor out of the two firſt Figures of the Dividual, *viz.* 2 out of 11, ſaying the Two's in 11, 5 times; but on Trial I find I cannot take 5 times thro' the whole Diviſor; for when I multiply the Diviſor by 5, I find the Product to be 11725, which cannot be taken out of 11117, that is, I cannot take 117 out of 111, wherefore I take one leſs, and ſet 4 in the Quotient, by which I multiply the Diviſor 2345, and find its Product 9380, which ſubtracted from 11117, leaves 1737 for the Remainder; to which I bring down the next Figure of the Dividend, *viz.* 8, and annex it on the Right-hand, and then there is 17378 for a Dividual, and the Work ſtands thus:

```
2345)345678901(14
          ..
     2345
     ————
     11117
      9380
     ————
      17378
```

Then I ſeek how oft I can have 2 in 17, and the Anſwer is 8 times; but on Trial I find it too much, wherefore I ſet 7 in the Quotient.

Note in general, *When you are upon Trial for the times you can take, you need only mind the two laſt Figures of the Product towards the Left-hand; for if you can take them out of the two firſt of the Dividual, it will moſt commonly bear the Times you take.*

Having ſet 7 in the Quotient, I multiply the Diviſor by it, and the Product is 16415, which I ſubtract from 17378, and the Remainder is 963; to which I bring down the next Figure in the Dividend, *viz.* 9, and then I have 9639 for a Dividual, and then the Work will appear as follows:

```
2345)345678901(147
     . . .
     2345
     -----
     11117
      9380
      -----
      17378
      16415
      -----
       9639
```

Here this laſt Dividend hath an equal Number of Figures with the Diviſor, *viz.* Four; wherefore I ſeek how often I can have 2, the firſt Figure of the Diviſor out of 9, the Firſt of the Dividual, and the Anſwer is 4 times, which I put in the Quotient, and then multiply the Diviſor by it, and the Product is 9380, which ſubtracted from 9639, the Remainder is 259, to which I bring down the Cypher, the next Place in the Dividend, and then I have 2490 for a Dividual; then I ſeek again, and ſet 1 in the Quotient, by which I multiply the Diviſor, and ſubtract according to Rule, and the Remainder is 245, to which I bring down the laſt Figure out of the Dividend, *viz.* 1, and then there is 2451 for the laſt Dividual; and then I ſeek again, and I find I can take but once, wherefore I ſet another 1 in the Quotient, and work as before; and I find the Remainder 106, and ſo the Work is finiſhed, as by the whole Operation in the following Page.

The PROOF.

To prove the following Sum, or any other Sums in this *Rule*, multiply the Quotient by the Diviſor, and if there be a Remainder, it muſt be taken in as you multiply; and if the Product is like the Dividend, the Work is right, as may alſo be ſeen in the *Example.*

```
2345)345678901(          147411
      ......               2345
     2345               -------
    ------               737061
     11117              589644
      9380             442234
    ------            294822
      17378          ------------
      16415          (345678901 Proof.
    -------          ------------
       9639
       9380
    -------                7
        2590            5  X  0  } Proof.
        2345               7
    -------
        2451
        2345
    -------
       (106) Remainder.
```

In proving (after I have ſet the Diviſor under the Quotient as in the *Example*) I ſay 5 times 1 is 5, and 6 that remains in the Units Place of the Remainder, is 11, 1 and carry 1, &c. When I come to the third Figure in the Multiplier, I take in the 1 that ſtands in the Place of Hundreds in the Remainder, as 3 times 1 is 3, and 1 is 4, &c.

Diviſion may alſo be proved by the Croſs, as in *Multiplication:* For Trial, let us prove the foregoing Sum thus.

```
   7
5  X  0
   7
```

Firſt caſt the Nines out of the Diviſor, and there remains 5, which I place on the Left of the Croſs (as you ſee in the Margin) then out of the Quotient, and there remains 0, which I ſet on the Right of the Croſs; then I multiply theſe two together, and they make 0; but the Nines muſt have been caſt out there alſo, if by multiplying them together they had made any, and what was over carried to the *Remainder*, which here makes 7, which I ſet on the Top, as in the Margin. Laſtly, I caſt away the Nines out of the Dividend, and there reſts 7. alſo, which I put underneath the Croſs, and finding the Top and Bottom Figures to be alike, I conclude the Work is right.

The foregoing Directions to the preceding *Examples*, are ſo plain and eaſy, that there is no occaſion for any more; ſo I ſhall ſet down ſome more *Examples* without any verbal Directions, thinking what hath been already ſaid to that Purpoſe to be ſufficient.

More Examples.

```
Diviſor 14)5873456(419532 Quotient.
            ....

            56
   2       ----
 5 X 6      27
   2        14
           ----
            133
            126
           -----
             74
             70
           -----
             45
             42
           -----
             36
             28
           -----
Remainder   (8)
```

```
47)27072329(576007
      ....            5
                    2 X 7
   235                5
   ----
   357
   329
   ----
    282
    282
   ----
     329
     329
    ----
     (0) Remainder.
```

Diviſor 426)7890123(18521

```
Diviſor 426)7890123(18521
            ....
            426
     3      ----
   3 X 8    3630
     3      3408
            ----
            2221
            2130
            ----
             912
             852
            ----
              603
              426
             ----
             (177)
```

```
96)7400900(77092
    ....
   672         2
   ---       6 X 7
    680        2
    672
   ----
     890
     864
    ----
      260
      192
     ----
      (68)
```

Here follow ſome other Sums, with their *Quotients* and *Remainders* only; their Working being purpoſely omitted; leaving that to the Learner, for a Trial of his Ingenuity.

As if you divide 796976499, by 49654, the *Quotient* will be 16050, and the *Remainder*, after the Work is ended, 29799.

Again, if you divide 5345678905, by 765432, the *Quotient* will be 6983, and the *Remainder* 667249.

Alſo, if you divide 45678901234, by 9876543, the *Quotient* will be 46249, and there will be a *Remainder* of 8775138.

And if you divide 123456789012, by 123456789, there will be for the *Quotient* 1000, and for the *Remainder* 12.

And that nothing may be wanting to a perfect Underſtanding of this *Rule*, I have ſubjoined the following *General Notes concerning* Diviſion.

1*ſt*. So many Places as are in your *Diviſor*, you point off ſo many in your *Dividend*, for your firſt *Dividual*, except the firſt Figure of the Diviſor exceed the firſt of the Dividend, and then you move a Place farther towards the Right hand, and make your Point there; and then your Dividual marked out, hath a Figure more than your Diviſor; and then you muſt take the firſt Figure of your Diviſor out of the two firſt Figures of your Dividual.

2dly, You never place a Cypher in the Quotient the firſt Time you ſeek.

3dly, The Times that you take the Diviſor out of the Dividual, never exceed 9.

4thly, The Dividual never exceeds the Diviſor above one Figure.

5thly, You never bring down but one Figure or Cypher at a Time, out of the Dividend.

6thly, For every Figure or Cypher brought down from the Dividend, there muſt be a Figure, or a Cypher placed in the Quotient alſo.

7thly, When you cannot take the Diviſor out of the Dividual, you muſt put a Cypher in the Quotient, and take another Figure from the Dividend: And if, again you cannot take it, place another Cypher in the Quotient, and then ſeek again.

8thly, When at any time, after you have ſubtracted, there remains nothing, and yet there remains a Cypher or Cyphers in the Dividend, it, or they muſt be put in the Quotient as Part of it, and the Work is done; and there will be no Remainder.

The ſhort Italian *Way of* DIVISION.

There is another Way of *Diviſion* ſhorter than the foregoing, becauſe you omit ſetting down the ſeveral Products of your *Multiplication*, but multiply and ſubtract together; and is like the common *Scratch* or *Cancelling* Way of *Diviſion*, only you are not at the Trouble of removing your Diviſor every Time you ſeek, as in that Way you are.

Example.

Let us divide the ſecond *Example* in Page 100, by this (as it is called) ſhort *Italian* Way; *viz.* Divide 16790 Days by 365. In order to the Work I ſet it down as before, thus:

365)16790(46
··
2190
(0)

Here I ſeek (as before) how oft I can have 3 in 16, (my Point being under 9, for the Dividual) and I find I can have but 4 times; wherefore I put 4 in the Quotient, and multiply the Diviſor (as before) ſaying 4 times 5 is 20, but I do not ſet down 0, and carry 2, as in the other Way; for the Product muſt not be ſet down, as was ſaid before, but forthwith ſubtract, ſaying, 4 times 5 is 20, 20 from 9 I cannot, but 20 from 29, (borrowing two Tens) and there remains 9, which I ſet under the Line; then 4 times 6 is 24, and 2 that I borrowed 26; from 7 I cannot, but 26 from 27, and there remains 1, which I alſo ſet down; then 4 times 3 is 12, and 2 that I borrowed is 14, from 16, and there remains 2, which I place under the Line; then there is a Remainder of 219, to which I bring down the Cypher out of the Dividend, and then I have the laſt Dividual 2190; then I ſay the 3's in 21, 6 times, by which I multiply the Diviſor, ſaying 6 times 5 is 30, from 0 I cannot, but 30 from 30 (borrowing 3 Tens) and there reſts 0; then 6 times 6 is 36, and 3 that I borrowed is 39; from 9 I cannot, but 39 from 39, and there remains 0; then 6 times 3 is 18, and 3 that I borrowed is 21, from 21 and there remains 0; and ſo the Work is done.

Let another *Example* be this: Divide 345678901 by 2345, which is the third *Example* in Page 101.

2345)345678901(1
· ·
11117

Here I ſay, once 5 is 5, from 6, and there remains 1, &c. then I bring down the 7, and ſet 4 in the Quotient, and ſay 4 times 5 is 20, from 7 I cannot, but 20 from 27, and there remains 7. Then 4 times 4 is 16, and 2 that I borrowed is 18; from 1 I cannot, but 18 from 21, and there remains 3. Then 4 times 3 is 12, and 2 is 14, from 1 I cannot, but 14 from 21, and there remains 7. Then 4 times 2 is 8, and 2 is 10, from 11, and there remains 1; ſo that there remains 1737, to which I bring down the next Figure 8, for the Dividual, and the Work ſtands thus:

2345)345678901(14
· ·
11117
17378

Again, I ſeek, and put 7 in the Quotient, and ſay 7 times 5 is 35; from 8 I cannot, but 35 from 38, and there remains 3. Then 7 times 4 is 28, and 3 that I borrowed is 31; from 7 I cannot, but 31 from 37, and there remains 6. Then 7 times 3 is 21, and 3 that I borrowed is 24; from 3 I cannot, but 24 from 33, and there remains 9. Then 7 times 2 is 14, and 3 that I borrowed is 17, from 17 and there remains 0. Then I bring down the next Figure 9, and the Work appears thus:

2345)345678901(147

11117

17378

9639

Then I bring down the reſt of the Figures one after another, working as before, till the whole is finiſhed in the following Manner:

2345)345678901(147411
. . . . . .

11117

17378

9639

2590

2451

Remainder (106)

Thus have I explained both the *Italian* Ways of Diviſion, leaving it to the Learner to uſe which he likes beſt. But my Method will be to purſue the firſt *Italian* Way thro' the remaining Part of this Book, it being very plain and eaſy to be underſtood.

There is a very ſhort Way of Diviſion (I think the ſhorteſt that can be) by Cancelling; and ſo I ſhall give one *Example* to ſhew its Brevity: My Deſign in this Book, being not only to ſhew the moſt intelligible, but the ſhorteſt Way of working in all the Rules.

Example.

```
                              11(1
                             472(4
                           142584(3
Divide 6945407 by       276)694507(25164
```

Firſt I ſeek, and find I can take two times, and ſay, twice 6 is 12; from 4 I cannot, but 12 from 14 (the 2 being over the Point or Stop for the firſt Dividual) and there remains 2; then twice 7 is 14, and 1 is 15; from 19, 4; then twice 2 is 4, and 1 is 5, from 6, 1: And then there is 1425 for the new Dividual, &c. See the Work; the Quotient being 25164, and the Remainder 143.

VIII. When there is a Cypher, or Cyphers, in the Diviſor, towards the Right-hand, you may cut it, or them off, with a downright Stroke of the Pen, and alſo do the ſame with as many Figures, or Cyphers, to the Right of the Dividend; and then divide the remaining Figures of the Dividend, by the remaining Figures of the Diviſor, as if there had been no Cyphers in the Diviſor, or Dividend; and what you cut off from the Dividend, is the Remainder, or Part of it: For what remains after the Work is done, muſt be put to what you cut off from the Dividend, for the whole Remainder.

Examples.

```
                                   By the ſhort Italian Way.
24|00)7694|06(320         345|000)8092320|000(23456
      72                          1192
     ----                         ----
      49                          1573
      48                          ----
     ----                         1932
Rem. (1406)                       ----
                                   2070
                                  ----
                           Rem. (0)
```

For the firſt of theſe *Examples*, there are two Cyphers in the Diviſor, wherefore I cut off two Places from the Dividend, and divide 7694 by 24, and there remains 14 at the laſt; to which I bring down the two Places cut off, *viz.* 06, and annex them to the 14, for the whole Remainder, *viz.* 1406, and the Quotient is 320.

In the ſecond *Example* there are 3 Cyphers in the Diviſor, which I cut off; and alſo as many in the Dividend; and divide by 345; and then the Work is done, and there remains nothing.

IX. Any Diviſion Sum, when the Diviſor is ſuch a Number that any two Digits or Numbers in the Multiplication-Table, being multiplied together, do make it, *viz.* the Diviſor, then ſuch Sum may be done at two Diviſions, or by component Parts much ſooner, and in ſewer Figures than at one.

Examples.

Divide 16560 by 48.

At one Diviſion	*At two* Diviſions, *or component (Parts.*
48)16560(345	6)16560
• • •	
144	8) 2760
216	345 Quotient.
192	
240	
240	
(0)	

Here the two Numbers in the Table, multiplied together, that make the Diviſor, are 6 and 8, for 6 times 8 is 48, the Diviſor: Wherefore I divide the Dividend 16560 by 6, and the Quotient is 2760, which I divide by 8, the ſecond Number, and the Quotient, by that, is the true Quotient ſought, *viz.* 345, as in the common Way.

Bring 1212288 Ounces of *Raw Silk*, into Pounds of 24 Ounces.

At one Diviſion.	*At two* Diviſions, *or component (Parts.*
24)1212288(50512	12)1212288
• • • •	
120	2) 101024
122	50512 *Quot. ſought.*
120	
28	
24	
48	
48	
(0)	

Here are eleven Figures Difference between the one Way and the other.

More Examples.

At one Diviſion. *By two* Diviſions, *or Component (Parts.*

```
72)488808(6789          8)488808
   ...                  --------
   432                  9)61101
   ---                  --------
    568                    6789 Quotient.
    504                 --------
    ---
     640
     576
     ---
      648
      648
      ---
      (0)
```

Here if I had taken 6 and 12 for my Diviſors, they would have produced the ſame Quotient, for 6 times 12 is 72, as well as 8 times 9.

```
(56 the Diviſor              (99 the Diviſor

7)18648                      9)537768
--------                     ---------
8) 2664                      11)59752
--------                     ---------
   333 Quotient ſought.          5432
                             ---------
```

If there happen to be any Remainder, either in the firſt or ſecond Diviſion, or in both, yet the Quotient will be the ſame. But when there are Remainders, the Way to find the true Remainder, as if you divided at once, is to multiply the firſt Diviſor by the laſt Remainder, taking in the firſt Remainder, if any be.

Of

Of MONEY.

X. Now I will ſhew how to divide Pounds, Shillings, and Pence, without reducing them any otherwiſe than in your Mind; and alſo how this Rule anſwers many Queſtions that ſeem to require a Recourſe to the *Rule of Three* for their Solution.

Divide 12*l.* 10*s.* 6*d.* among 5 Perſons.

Diviſor 5)12 10 6 Dividend.

Each muſt have 2 10 $1\frac{1}{5}$ *Quotient or Anſwer.*

Here I ſay the Fives in 12, twice, and there remains 2, which are two Pounds, (for the Remainder is always the ſame with your Dividend) or 40 Shillings, and 10*s.* in the Shillings Place, is 50*s.* the Fives in 50, ten times, which I put in its Place, *viz.* under the Place of Shillings, Then the Fives in 6, once, and there remains 1, which is one Fifth of a Penny. So each Man muſt have 2*l.* 10*s.* 1*d.* $\frac{1}{5}$ for his Share.

The common Way.

The foregoing Work is much ſooner done, and looks a great deal handſomer than that in the Margin; for there you are obliged to reduce the 12*l.* 10*s.* 6*d.* into Pence, and then you divide by 5, and the Quotient gives the Pence each Perſon muſt have; and then thoſe Pence are brought into Pounds, &c. The Sum above is proved by the brief Rules in the Multiplication of Money, ſufficiently ſhewn in that Rule, in the following Manner

```
  l.      s.   d.
  12      10   6
  20
 ----
 250
  12
 -------
5)3006(1/5
 -------
12)601(1
 -------
2|0)5|0(1
 ---------  ----
l. 2      10   1 1/5
 ---------  ----
        l. 2. &c.
```

l. 2 10 1 $\frac{1}{5}$ Each.
5 Perſons.

l. 12 10 6 Proof.

In this excellent Method of *Diviſion* of ſeveral Denominations (for *Weight* or *Meaſure* may be ſo divided as well as *Money*) whatever remains you always bring it (in your Mind only) into the Quality of the next Denomination towards the Right-hand; and if there be any thing there, you take it in, and then ſeek, *&c.* as in the foregoing Sum, where I ſaid, the Fives in 12, twice, and there remained 2, which I turned into Shillings, (the Name of the next Denomination) which, with the 10 Shillings in the Place of Shillings, make 50; then I ſay the Fives in Fifty, *&c.*

8)
Again, Divide l. 67 09 4 among 8 Perſons.

Quotient l. 08 08 8 *Anſwer.*

Here I ſay the Eights in 67, 8 times, and there remains 3*l.* or 60 Shillings, and 9 Shillings in the Place of Shillings, is 69, the Eights in 69, 8 times, and there remains 5 Shillings, or 60 Pence, and the 4 in the Place of Pence, make 64; the Eights in 64, 8 times, and nothing remaining. So each muſt have *l.* 8 08 8, as by the Work above.

If 5 Gallons of Brandy coſt 1*l.* 16*s.* 8*d.* what is that the Gallon?

A General Rule.

Divide the Money by the Quantity: And here I ſay the Fives in 36, *&c.*

5)1

	l.	s.	d.
	5)1	16	8
Anſwer	0	07	4
			5
Proof	1	16	8

	9) s.	d.
If 9 Stone of Beef coſt hat is that a Stone ?	16	6
	1	10 *Anſwer.*

		9)		
If 9 Gallons of Arrack coſt hat is that a Gallon ?	*l.*	4	08	01 $\frac{1}{2}$
	Anſwer	0	09	09 $\frac{1}{2}$

		11)		
f 11 *C.* of Hops coſt hat is that *per C?*	*l.*	53	01	06
	Anſwer	4	16	06

If the Charge of a Country Feaſt amounts to 314 *l.* 6*s.* 8*d.* and it is to be paid by 12 Stewards, what uſt each Steward pay ?

		12)		
	l.	314	16	8
Each muſt pay	*l.*	26	04	8 $\frac{1}{2}$ $\frac{8}{12}$
				12
		314	16	8 *Proof.*

XI. As in Diviſion of one Denomination, according to the 9th Rule of this Chapter, where two Numbers in the *Multiplication-Table* make the Diviſor, being multiplied together, the Work might be performed at two Diviſions; ſo in *Diviſion* of ſeveral Denominations, the Work may be done after the ſame Method, following the Directions given in the ſaid 9th Rule.

Examples.

A Reckoning of *l.* 6 00 00 among 32 Men, wha muſt each Man pay?

4) *l.* 6 00 0

8) 1 10 0

Each pays 0 3 9

Here the two Numbers are 4 and 8, therefore I fir divide by 4, and then that Quotient by 8; or firſt b 8, and then by 4, it will be all one.

If 56 *lb.* of Coffee coſt what is that a Pound?

7)
l. 21 11 8

8) 3 01 8

Anſwer 00 07 8

10)
Divide *l.* 32 12 6 between 100 Perſons.

10) 3 05 3

0 06 6 $\frac{3}{10}$ each.

If 72 Gallons of Wine coſt what a Gallon?

	8)		
	l. 19	4	0
	9) 2	08	0
Anſw.	0	05	4

If 81 *lb.* of Nutmegs coſt what a Pound?

l. 9)	49	17	3 ¾
9)	5	10	9 ¾
Anſw.	0	12	3 ¾

If 45 *C.* of Hops coſt what 1 *C.* Weight?

l. 5)	120	07	6
9)	24	01	6
Anſw. l.	2	13	6

A General RULE for WEIGHT.

Having the Price of a *C.* Weight, to know the Price of a Pound. Divide by 7 and 8, (7 times 8 being 56, the Half Hundred Weight) and take the Half of the laſt Quotient, which Half will be the Anſwer.

Examples.

If 112 *lb.* of Caſt-Iron coſt what a Pound?

	s.	*d.*
7)	2	4
8)		4
		2
		½

The Half of a Half-penny is ¼ *Price of a* lb.

If 112 *lb.* of Lead coſt what a Pound ?

7) 7*s.*

8) 1

1 $\frac{1}{2}$

The Half is $\frac{3}{4}$

If 112 *lb.* of Sugar coſt what a Pound ?

7) *l.* 1 17 4

8) 05 4

8

The Half of 8 is 4*d.* Anſ.

If 112 *lb.* of Currants coſt what a Pound ?

7) *l.* 3 10

8) 10

1 3

The Half of 15*d.* is 7$\frac{1}{2}$

So at any time, in any Diviſion Sum, if the Diviſor be 112, the Quotient is ſoon found by this Way of *Diviſion* by Parts.

I will give one *Example* alſo by the common Way, to ſhew the Tediouſneſs of the one, and the Expedition of the other.

The common Way.

Divide *l.* 1476 19 8$\frac{3}{4}$ between 27 Perſons.

20

29539

12

354476

4

27)1417907 *Farth.* 4)52515 *Farthings each.*

135 12)13128$\frac{3}{4}$

67 2|0)109|4

54 *Anſwer l.* 54 14 0$\frac{3}{4}$

139

135

40

27

137

135

(2)

The other Way.

3)1476 19 8$\frac{3}{4}$

9)492 06 6$\frac{3}{4}$ $\frac{1}{3}$

Anſw. l. 54 14 0$\frac{3}{4}$

Here is a prodigious Difference between one Way and the other, one having almoſt 60 Figures more in the Work than the other.

Note,

Note, That Weight and Meaſure may be divided by Parts, as Money.

Example.

If 42 Bags of *Spaniſh* Wool weigh what 1 Bag?

	C.	*qrs.*	*lb.*
6)	110	1	00
7)	18	1	14
Anſw.	2	2	14

If 45 Pieces of Linen contain what one Piece?

	Yds,	*qrs.*	*Nls.*
9)	2157	0	3
5)	239	2	3
Anſw.	47	3	3

CHAP. VI.

REDUCTION

I. IS wholly performed by *Multiplication* and *Diviſion*; and teaches to bring or change Numbers of one Denomination into Numbers of another, without the leaſt Alteration of Value, tho' in different Terms. For Inſtance,

Suppoſe I am to bring 20*l.* into Farthings, which when I have done, the Work will produce 19200 Farthings, which are equal in Value to *l.* 20: For when they are reduced rightly back again, the laſt Quotient will preciſely produce *l.* 20, neither more nor leſs.

II. All great Names are brought into ſmaller of equal Value, by *Multiplication*; that is, by multiplying the given Number by as many of the next leſſer Name, as makes one of that greater; as *Pounds* into *Shillings*, *Pence*, or *Farthings*. Or *Tuns Weight* into *Pounds Weight*, &c.

III. All ſmall Names are brought into greater, of equal Value, by *Diviſion*; that is, by dividing the given Number by as many of the leſſer, as makes one of the next greater Name; as *Farthings* into *Pence*, *Shillings*, or *Pounds*; or *Pounds Weight* into *Quarters*, *Hundreds*, or *Tuns Weight*.

Example 1.

In 20*l.* how many Farthings?	20*s.*
20 Shillings makes a Pound.	12
400 Shillings in 20*l.*	Pence, 240 in a Pound.
12 Pence makes 1*s.*	4
4800 Pence in 20*l.*	Farth. 960 in a Pound.
4 Farthings, one Penny	

Or thus:

19200 Farthings in 20*l.*	20*l.*
	960 Farthings.
	in a Pound.
Farthings.	19200 Anſwer.

In the Queſtion above, it is required to bring *Pounds* into *Farthings*, which is a greater Name to be brought into a ſmaller; which, according to the IId Rule of this Chapter, is to be done by *Multiplication*. Wherefore, as is there directed, I multiply the given Number 20*l.* by

20, the Shillings in a Pound, and the Product is the Shillings in 20*l.* Then thoſe Shillings by 12, the Pence in a Shilling, and the Product is the Pence in 20*l.* and thoſe Pence by 4, the Farthings in a Penny, and that Product is the Farthings in 20*l.* and the Anſwer to the Queſtion, as may be ſeen by the preceding Work.

Or, as before, I multiply the 20*l.* by 960, the Farthings in a Pound, but I multiply 960 by 20, tho' the 20 be uppermoſt, to ſave Room; for, at any time the *Multiplier* may be multiplied by the *Multiplicand*, the Product being the ſame either Way.

By the foregoing Method are all *Reductions* deſcending, (that is, from great Denominations to leſſer) work'd, whether they be *Money*, *Weight*, or *Meaſure*, that is, by conſidering how many of the next leſſer make a Unit, or one of the foregoing greater Denominations, as before directed; and then multiply accordingly, deſcending from one Denomination to the next, till the Work is finiſhed. And, for further Aſſiſtance, Reſpect muſt be had to the ſeveral Tables of Quantity in *Money*, *Weight*, and *Meaſure*, in the IId Chapter of this Book.

Pounds multiplied by 20 produce Shillings; Shillings multiplied by 12 give Pence; Pence multiplied by 4 produce Farthings.

Farthings divided by 4 are Pence; Pence divided by 12 quote Shillings; Shillings divided by 20 are Pounds.

Example 2.

In 19200 Farthings, how many Pounds?

4)19200

12)4800

2|0)400

l. 20 *Anſwer.*

Or thus:

l.

96|0)1920|0(20

192

(0)

Here it is required to bring Farthings into Pounds; which is a ſmall Name into a greater; and therefore, according to the IIId Rule of this Chapter, it is done by Diviſion: Wherefore I divide the given Number, 19200 by 4, the Farthings in a Penny, and the Quotient is Pence; and thoſe Pence I divide by 12, the Pence in a Shilling, and the Quotient is Shillings; and thoſe Shillings I divide by 20, the Shillings in a Pound, and the Quotient is Pounds; to wit, 20*l.* and is a ſure Proof of the foregoing *Example.*

Or I divide the 19200 Farthings by 960, the Farthings in a Pound, and the Quotient is the ſame, *viz.* 20*l.*

Example 3.

In 576*l.* how many Shillings, Pence, and Farthings?
By 20

11520 Shillings.
By 12

(*Thus is a great Name to be brought into a ſmaller, and therefore I multiply.*)

138240 Pence.
By 4

552960 Farthings.

Example 4.

In 552960 Farthings, how many Pence, Shillings, and Pounds?

Divide by { 4)552960
12)138240
2|0)11521|0

l. 576 *Anſwer and Proof.*

This is the Reverſe of the 3d *Example*, and a ſmall Name to be brought into a great; and therefore I divide, and find *l.* 576, the Anſwer and Proof to the ſaid *Example*; for *Reduction* aſcending, proves *Reduction* deſcending; and the contrary.

Note, *When you are to bring Shillings into Pounds (let the Number be what it will,) cut off the laſt Figure or Cypher towards the Right-hand, and halve the other towards the Left (which is dividing by* 20, *but ſhorter) and that Half ſhall be Pounds; and the Figure cut off is Shillings: And if any thing remain after the halving of the laſt Figure, which is never more than one, it muſt be joined to the Figure, or Cypher cut off, as in the* 4th Example *foregoing, and in the following*, viz.

Bring 4231|7 Shillings into Pounds.

l. 211-17

Here the ½ of 4 is 2, the ½ of 2 is 1, and the ½ of 3 is 1, and there remains 1, which is 1 Ten, which muſt be put to the 7 cut off, and it makes 17*s*. So the whole is *l.* 211–17, as above. By the ſame Method may *Tuns* be reduced into *Hundred Weights*.

A General RULE.

When you have Pounds to be reduced into Farthings, multiply by 20, by 12 and by 4; or by 960, the Farthings in a Pound.

When you have Farthings to be reduced into Pounds, divide by 4, by 12, and by 20, or by 960.

If Pounds are to be brought into Pence, multiply by 240, the Pence in a Pound: If the contrary, divide by 240.

Example 5.

Reduce 476 *l.* into Pence.
240
19040
952
Pence 114240

Here I multiply by 12, and by 2, twice 12 being 24; and for the Cypher I add it at the laſt.

Or thus: According to the 8th Rule of Chap. 4.
476
12
5712
2
114240

Reduce 114240 Pence into Pounds, by dividing by 240.

24|0)11424|0(476 Anſwer.
96
182
168
144
144
(0)

Or thus:
12)11424|0
2) 952
Anſw. *l.* 476

Here, in the ſecond Way after I have cut off a Place from the Dividend, for the Diviſor's Cypher, I divide by 12, and by 2, which multiplied together make 24, and for the Cypher to make it 240, there's a Place cut off from the Dividend; ſo that I divide only by 12, and by 2, according to the IXth Rule of the foregoing Chapter. See the Work above.

By the ſecond Way there are many Figures, and much Trouble ſaved; as may be ſeen by comparing one Way with the other.

Example 6.

Bring 476 Pounds into Farthings, by multiplying by

	Or thus:
960	*l.* 476
476	8
5760	3808
6720	12
3840	
Farthings 456960	Farthings 456960

In the ſecond Way I multiply by 8, and by 12, according to the VIIIth Rule of the IVth Chapter, 8 times 12 making 96, and I add the Cypher at laſt.

Example 7.

Bring 456960 Farthings into Pounds, by dividing by 96(c)45696|0(476 *l. Anſwer.*

	Or thus:
384	8)45696|0
729	12) 5712
672	*l.* 476 *Anſw.*
576	
576	
(0)	

IV. When the Sum to be reduced conſiſts of ſeveral Denominations; as Pounds, Shillings, and Pence; or Tuns, Hundreds, Quarters, and Pounds, then you muſt multiply as before; but you muſt take in the Shillings, Pence, or Farthings, that ſtand in each Denomination, as you reduce the higher Name to the next inferior.

Example 8.

In *l.* 426 19 8½, how many Farthings?
20

8539 Shillings.
12

102476 Pence.
4

409906 Farthings. Anſwer.

Here I firſt multiply by 20, ſaying, 0 is nothing, but 9 that ſtands in the Units Place of Shillings, is 9; then twice 6 is 12, and 1 that ſtands in the Tens Place of Shillings is 13, 3 and carry 1, &c. Then, when I come to reduce the Shillings into Pence, I ſay 12 times 9 is 108, and 8 that ſtands in the Place of Pence is 116, 6, and carry 11, &c. Then, when I reduce the Pence into Farthings, I ſay, 4 times 6 is 24, and 2 that ſtands in the Place of Farthings is 26, 6 and carry 2, &c. *See the Work.*

Example 9.

4)
In 409906 Farthings, how many Pence, Shillings, (and Pounds?

d.
12)102476½

s.
2|0)853(9-8*d.*

l. 426-19-8*d.* ½ Anſwer and Proof.

I firſt divide by 4, and there remains ½ that was taken in; and then by 12, and there remains the 8*d.* taken in; and then by 20 (or cut off the laſt Figure, and halve the other, as before directed, to bring Shillings into Pounds) and there remains the 19 Shillings taken in.

Example 10.

4)
In 2403590 Farthings, how many Pounds, *&c.*

12)600897½
2|0)5007|4-9*d.*
l. 2503-14 9½

Here I divide by 4, by 12, and by 20, according to the foregoing general Rule.

Example 11.

In *l.* 2503-14-9½, how many Farthings?
20
50074
12
600897
4
2403590 Farthings.

Here I multiply by 20, by 12, and by 4, according to the before-mentioned general Rule.

Theſe two Sums are a Proof to each other.

In 30 *Merks, and* 40 *Groats, and* 50 *Engliſh Crowns, How much in Value is their Worth, intrinſicly in Pounds?*

Anſw. 33 3 4

Example 12.

In *l.* 742–14–6, how many Pence?

20

14854

12

178254 *Anſw.*

Here I multiply by 20, and take in the 14*s.* and then by 12, and take in the 6, according to the IVth Rule of this Chapter.

Example 13.

12)

In 178254 Pence, how many Pounds, *&c.*

2|0)1485|4–6

l. 742–14–6 *Anſwer.*

In *l.* 759 17 8 ½, how many Halfpence?

Anſwer 364745.

Multiply by 20, 12, and 2.

Bring 364745 Halfpence into Pounds, *&c.*

Divide by 2, 12, and 20.

Or Halfpence may be brought into Pounds by dividing componently, by 480, and Pounds into Halfpence by multiplying by 480.

In *l.* 529 12 6 ⅝, how many Eighths of a Penny?

Anſwer 1016885.

Multiply by 20, 12, and 8, taking in, *&c.*

Bring 1016885 Eighths of a Penny into Pounds, &c.

Divide by 8, 12, and 20.

Any Number of Pence may be brought into Pounds, Shillings and Pence, at one Working, thus: Add a Cypher to the given Number and divide them by 240, as uſual, doubling the laſt Figure of the Quotient for Shillings, and the Remainder is Pence; as for *Example:* Bring the foregoing 13th *Example*, viz. 178254 Pence, into Pounds, Shillings, and Pence, at one Work.

```
24|0)178254|0(74217
       ...        2
     168 ———————————
     ———fac.742-14-6
     102 ———————————
      96      Or thus :
     ———      2)178254
      65     ———————————
      48     12)89127-6
     ———     ———————————
     174         742-7
     168             2
     ———     ———————————
Rem. (6d.)   l. 742-14-6
     ———     ———————————
```

Here the laſt Figure, 7, doubled is 14*s.* and the 6 remains.

```
   Or thus :
 12)178254
 ——————————
 2)14854|4-6
 ——————————
 l. 742-14-6
 ——————————
```

Here I omit the Cypher, becauſe I neglect it in the Diviſor.

So likewiſe may Farthings be brought into Pounds, Shillings, Pence or Farthings at one Work, by adding a Cypher, and dividing by 960, doubling the laſt Figure of the Quotient for Shillings, as above.

Example.

Example.

In 39291 Farthings, how many *l. s. d.* and *qrs?*
Anſwer *l.* 40 18 6$\frac{3}{4}$.

96|0)39291|0(40—09
2
384
l. 40 18 6$\frac{3}{4}$ Anſwer.
891
864
(27) *qrs.* is 6*d.* $\frac{3}{4}$.

Or you may omit adding the Cypher to the given Number, ſince you cut off the Cypher from your Diviſor; but you muſt not forget to double the laſt Figure: Or it may be done at two Diviſions, thus:

8)39291
12)4911 $\frac{3}{8}$
40-9$\frac{3}{12}$
2
Facit. *l.* 40 18 6$\frac{3}{4}$

The firſt Remainder is $\frac{3}{8}$, and the laſt three Twopences.

Or by multiplying the firſt Diviſor 8, by the laſt Remainder 3, taking in the firſt Remainder 3, (as the Rule in *Diviſion* by component Parts directs) makes 27 Farthings, equal to 6*d.* $\frac{3}{4}$.

Of

Of COINS.

Here the ſeveral Species of *Coin* muſt be reduced into one Name, whether Shillings, Pence, or Farthings; and then divide the greater Number by the leſſer, and the Quotient will be the Anſwer.

Example 1.

In *l.* 262 4–6 *Sterling*, how many Dollars at 4*s.* 3*d.* *Sterling?*
20 12
5244 Diviſor 51 Pence.
12
Doll.
51)62934 Pence. (1234 Anſwer.

As above directed, I reduce the Dollar into Pence, and it makes 51; and then alſo the *l* 262–4–6 into the ſame Name, *viz.* Pence, and they are 62934, which I divide by 51, the Pence in a Dollar; and the Quotient is the Anſwer, *viz.* 1234 Dollars.

Example 2.

In 1234 Dollars, at 4*s.* 3*d.* how many *l. Sterl.*
51 12
1234 Multiply 51 Pence.
6170
12)62934 Pence.
2|0)524|4–6
Anſw. *l.* 262–04–6

Here I multiply the Number of Dollars by the Pence in one; and the Product is the Pence that are in them all; which I divide by 12, and by 20, which brings thoſe Pence into Pounds.

Example 3.

In *l.* 562–18, how many *French* Crowns at (54*d.* $\frac{1}{8}$ *per* Crown.

20 8

11258 433

12

135096

8

Crowns.

433)1080768(2496 Anſwer.

866···

2147

1732

4156

3897

2598

2598

(0)

Here I firſt bring the Crowns into Eighths, by multiplying by 8, and taking in the 1 over the 8; and then I do the ſame, by *l.* 562–18, that the Dividend and Diviſor may be of the like Name; and then I divide the one by the other, and the Quotient gives the Anſwer, *viz.* 2496 Crowns.

Example

Example 4.

In 2496 *French* Crowns, at 54*d.* $\frac{1}{8}$ *per* Crown, how [many *l. Sterl.*
433 8

7488 433
7488
9984

8)1080768 Eighths.

12)135096
2|0) 11225|8

l. 562 18 Anſ. and Proof to the above Queſtion.

Example 5.

In 426 Piſtoles, at 17*s.* each, how many Guineas, at [21*s.* 6*d.*
204 12 12

1704 Pence 204 Multiplier.
8520 Diviſor 258

258)86904(336$\frac{216}{258}$ Guineas Anſwer.
774

950
774

1764
1548

(216)

Here the Pence in 426 Piſtoles, are divided by the Pence in a Guinea, and the Quotient is the Anſwer, *viz.* 336 Guineas, and 216 Pence over, which is 18 Shillings.

Example 6.

In 336 Guineas, and 216 Pence, how
Pence in a Guinea. 258 (many Piſtoles at 17*s.* each?
12
2688
1680
Diviſor 204
672
216 Pence that remained.
Piſtoles.
204)86904(426 *Anſwer and Proof to the*
816.. (*foregoing Queſtion.*
530
408
1224
1224
(0)

Piſtoles of 17*s.* are brought into Guineas of 21*s.* by multiplying by 17, and dividing by 21.

Example 7.

In 436 Piſtoles, how many Guineas?

Anſwer 352$\frac{20}{21}$ That is, 353 Guineas, wanting 1*s.*

Guineas into Piſtoles by the contrary Practice.

Broad-pieces at 23*s.* are brought into ditto at 25*s.* by taking $\frac{1}{4}$ Part, *viz.* Pieces 246 at 23*s.* amounts to 282*l.* 18*s.* the $\frac{1}{4}$ of which gives 61*l.* 10*s.* that is of 246, which put to 246 Pieces, makes 307*l.* 10*s.* the Value of 246 Broad-pieces at 25*s.*

Example 8.

In 1546 *Pieces of Eight*, at 4*s*. 6*d*. how many *l. Sterl.*

54 Pence in one 12
Pieces of *Eight*.
6184 54
7730
12)83484 Pence in them all.
2¦0)695|7
l. 347–17 Anſwer.

Or this Queſtion may be done by *Multiplication of Money*, according to the Method taught in that Rule, thus:

	l.	*s.*	*d.*	
1546 Pieces of *Eight*, at		4	6	
			10	
	l. 02	05	0	The Value of 10.
			10	
	22	10	00	of 100.
			10	
1000—	225	00	00	
500—	112	10	00	
40—	9	00	00	
6—	1	07	00	
Anſw. 1546	*l.* 347	17	00	

Example 9.

In *l.* 497 06 08, how many Marks at 13*s.* 4*d*?

20
9946
12
Marks
16|0)11936|0(746 Anſwer.
112
73
64
96
96
(0)

12
Diviſor 160

Or thus:
4)11936
4)2984
Anſw. 746 Marks.

Here 4 times 4 is 16, omitting the Cypher in the Diviſor, and therefore cut none off from the Dividend.

Example 10.

In 746 Marks at 13*s.* 4*d.* how many Pounds?

160
44760
746
119360 Pence.

12
160

12)119360
2|0)994|6–8*d.*
l. 497–6–8 Anſw.

Or Marks, or any thing elſe at 13*s.* 4*d.* are brought into Pounds, *&c.* by multiplying by 2, and dividing by 3, and what remains will be 1 or 2 Nobles.

Pounds, Shillings, and Pence are brought into Marks by adding ½, as by *Example* the 9th.

In *l.* 497 06 8 how many Marks?
248 13 4
Marks 746 Anſwer.

Again, Marks are brought into Pounds by deducting $\frac{1}{3}$, *Example* the 9th.

In 746 Marks, how many Pounds?
248 13 4 The $\frac{1}{3}$ to be deducted.

l. 497 06 8 Anſ. and Proof to the Example above.

In 40 *Marks, and* 90 *Groats and Pounds in Number ten,*
The Pence and Farthings there contain'd, I aſk it from your Pen?

Anſwer. { 9160 *Pence.* 36640 *Farthings.* }

The 10th Example foregoing may be done by *Multiplication*, thus:

746 Marks at	13	4	
		10	
l. 6	13	4	Value of 10 Marks.
		10	
66	13	4	Ditto 100 Marks.
		7	
466	13	4	Ditto 700
26	13	4	Ditto 40
4	00	0	Ditto 6
Anſw. *l.* 497	06	8	

Or thus:

746
4
2984
4
12)119360
2|0)994|6–8
l. 497 06–8

In the Example on the Left-hand, after I have multiplied by 4 and by 4, I annex a Cypher, to make the laſt Product Pence; in regard that there's a 0 in 160, the Pence in a Mark.

Example 11.

In *l.* 389 10, how many Florins, at 3*s.* 2*d.*
20 12
7790 38*d.*
12
Florins.
8)93480(2460 *Anſwer.*
76 . . .
174
152
228
228
(0)

Example 12.

In 2460 Florins, at 3*s.* 2*d.* how many *l. Sterling?*
38 12
19680 38 Pence.
7380
)93480 Pence.
0)779|0
. 389 10 Anſwer and Proof.

At any Time when you can diſcover how many of one Sort of Pieces or Coin, are equal to any Number of the ther, the Example is ſpeedily done, by multiplying by the Leſſer, and dividing by the greater Number. Example. *In* 542 4*d.* ½, *how many* 13*d.* ½ *? Multiply by* 3, *and ivide by* 9. Anſw. 180 $\frac{6}{9}$ Pieces 13*d.* ½, *there being* 4*d.* ½, *and* 9 *Halfpence in* 4*d.* ½.

Example 13.

In 2712 Guilders, at 2*s.* each, how many Rix-Dollars,
96 (at 4*s.* 5*d.* ½?
12
16272 Halfpence 48 in 2*s.*
24408 2 53
4
214)260352(1216 Rix-Dol.] *qrs.* 96 in a *Gil.*
214 . . . 214 *qrs.* in a (*Dollar*
463
428
355
214
1412
1284
(128)

Here the Anſwer is, 1216 Rix-Dollars, and 128 Farthings, *Remainder*, or 2*s.* 8*d.*

Pounds are brought into Guineas by multiplying by 20, and dividing by 21; thus,

In 730*l.* how many Guineas?
20
7)14600
s.
3)2085–5
Anſwer 695 Guineas, and 5*s.* over.

If I had Nobles Eighty Score, and Marks juſt Fifty-two,
In part of 1400 l. *what Money reſts ſtill due?*

Anſwer 832 l.

In 695 Guineas, and 5*s.* how many Pounds?

Guin. *s.*
695 5
7 and 3 multiply by.

4865
3
2|0)1460|0 — The 5 Shillings taken in.

l. 730 *Proof.*

Example 14.

In 798 *l.* how many Nobles, Marks, Crowns, Shillings, Pence, and Farthings?

Nobles in 20*s.*	3
Nobles	2)2394
Marks	1197
	798
Crowns in a Pound	4
Crowns	3192
Shillings in a Crown	5
Shillings	15960
Pence in a Shilling	12
Pence	191520
Farthings in a Penny	4
Farthings	766080

I bring the Nobles into Marks, by dividing them by 2, becauſe 2 Nobles make a Mark.

Examples for Practice.

In *l.* 74622 17 6, how many Half-Crowns? Multiply by 8, and take in 7. Anſw. 596983

In *l.* 22740 13 4, how many Nobles? Multiply by 3, and take in 2. Anſw. 68222

In 76543 *Bitts* of *Jamaica*, each 7*d.* $\frac{1}{2}$ *Sterling*, how many Pounds *Sterling?* Anſw. *l.* 2391 19 4$\frac{1}{2}$

In *l.* 1725 19 4 *Sterling*, how many *Spaniſh* Dollars, at 4*s.* 4*d.* Anſw. 7966

In 279623 Millreas of *Portugal*, at 5*s.* 3*d.* $\frac{1}{4}$, how many Pounds *Sterling?* Anſw. *l.* 73692 06 2$\frac{3}{4}$

In 1276 Moidores, at 26*s.* 6*d.* how many Guineas, at 21*s.* Anſw. 1610$\frac{48}{252}$

In 150000 Cruſades, each 400 Reis, 1000 Reis to a Millrea, at 5*s.* 6*d.* *Sterling*, how many Pounds *Sterling?* Anſw. 16500

In *l.* 3400, how many Crowns, Half-Crowns, Shillings, Groats, and Three-pences, and of each the ſame Number?

Anſw. 7486 Pieces of each Sort, and 2*s.* 2*d.* over.

AVOIR-

AVOIRDUPOIS-WEIGHT.

In reducing this Weight, *Troy-Weight*, or of *Meaſure*, *Time*, &c. you muſt be acquainted with the *Tables of Quantity*, in the 2d Chapter of this Book.

Example 1.

Tuns. *C.* *qrs.* *lb.*
In 24 14 3 15 how many Pounds Weight?
20*C.* 1 Tun.

494 Hundreds Weight.
4 Qrs. 1 *C.*

1979 Quarters.
28 *lb.* 1 *qr.*

15837
3959

A. 55427 Pounds.

Here are great Names to be brought into ſmaller, and therefore to be done by *Multiplication*; wherefore I multiply, according to the Table in the aforementioned Chapter, *viz.* by 20, by 4, and by 28; taking in the odd Weight in each Denomination, as in *Reduction of Money*; and the laſt Product is the Anſwer, *viz.* 55427.

Example 2.

28)
In 55427 Pounds, how many Tuns, &c.
28···
4)1979

274
252
2|0)49|4–3

222
196
Tuns 24 14 3 15 Anſ.

267
252

(15)

Here I proceed reverſely, dividing by 28, by 4, and by 20. Or this *Diviſion* Sum may be done by 4 and 7, the component Parts of 28.

In 5036 Pounds Weight of Cotton, how many Hundreds Weight?

	C.	*qrs.*	*lb.*
Anſwer	44	3	24

Example 3.

C. qrs. lb. oz. dr.
In 24 3 24 12 14 how many Drams?
4 Qrs. 1 C.

99 Quarters
28 lb. 1 Quarter.

796
200

2796 Pounds.
16 *Oz.* 1 *lb.*

16778
2797

44748 Ounces.
16 Drams 1 *Oz.*

268492
44749

In 16)715982 Drams, how many Hundreds, *&c.* 4)
64····
75
64
119
112
78
64
142
128
(14) *C.* 24 3 24 12 14 Anſw. and Proof.

16)44748
32···
127
112
154
144
108
96
(12)

28)2796(99 *qs.*
252 24–3.
276
252
(24)

Example 4.

In C. 24 3 26 how many Pounds?
4

99
28

798
200

Anſw. 2798 Pounds

Or thus:
112 lb. a C. Weight.
24 The Number of C.

448
224
110 The odd Weight.

lb. 2798 Anſw.

Example 5.

C. *qrs.* *lb.*
In 425 3 22 how many Pounds?
Mult. by 112

5100
425
106 Odd Wt.

47706 Anſwer.

Here I ſay, 12 times 5 is 60, *&c.* and take in the odd Weight at laſt.

A Quicker Way.

F Hundreds, Quarters, and Pounds may be ſpeedily reduced into Pounds, thus: Set down the groſs Hundreds, four ſeveral Times, in the Form following, and take in the odd Weight, as above.

C. *qrs.* *lb.*
In 24 3 26
24
24
24
110 Odd Weight.

Anſw. 2798 Pounds, as above.

Here is nothing to do but to ſet the Hundreds down, as before, with the odd Weight, and add them together, and therefore it is the ſhorteſt Way of all others to reduce Hundreds groſs into Pounds.

More Examples.

In C. 27 3 19 how many Pounds?

27	112 lb. 1 C. Weight.
27	27
27	
103 Odd Weight.	784
	224
Anſwer 3127 Pounds.	103 Odd Weight.
	3127

In 1 Hogſhead, *qt.* C. 7½ 12 how many Pounds?
7
7
7,68 Odd Weight.

Anſwer 852 Pounds.

C. *qrs.* *lb.*
In 256 1 17 how many Pounds?
256
256
256,45 Odd Weight.

Anſwer 28717

In 476 C. ¼ 24 lb. of Copper, how many Pounds?
Anſwer 53364.

In

In C. 4 3 27 how many Pounds?

4	112lb. 1 C. Wt.
4	4
4	448
111 Odd Weight.	111 Odd Weight.
559 Anſwer.	559 Proof.

Examples at large.

In C. 9½ 14lb. of Indigo, how many Pounds?
112
1078 Anſwer.

In C. 246¾ of Cotton Yarn, how many Pounds? Anſwer 27636.

Tuns. *C.* *qrs.* *lb.*
In 276 12 3 24 of Cheeſe, how many Pounds? Anſwer 619692.

In 574859 Pounds of Copper, how many Tuns, &c.

Tuns. *C.* *qrs.* *lb.*
Divide by 112, &c. Anſwer 256 12 2 19

In 426 C. of Tobacco, how many Boxes, each to weigh 12lb. Anſwer 3976.

In C. 417 3 12 of Pimento, how many Caſks, each C. 3¼ 26lb. Anſwer 120.

In 242 Caſks of Nutmegs, each 3 C. ½, how many Ounces? Anſwer 1517824.

Suppoſe 6 Oxen weigh C. 38 2 8 how many Stone?
Anſwer 540.

Turkiſh Silk of 24 Ounces to the Pound, is reduced to Pounds of 16 Ounces by adding ½, becauſe 8, the ½ of 16, is the Difference between 16 and 24.

Example.

Reduce 756 lb. of *Tripoli* Belladine Silk, of 24 Ounces to the Pound, to 16 Ounces to the Pound.

756
24
3024
1512
16)18144(1134 Anſwer.

Short Way.

756
378 The ½ added.
1134 Anſwer.

If I have C. 155 3 22 of Beef for Sea Uſe, and to be cut in Pieces, *viz.* into ½ Pound Pieces, Pound Pieces, Pound and ½ Pieces, 2 Pound Pieces, 3 and 4 Pound Pieces, and of each of theſe Quantities an equal Number, *i. e.* as many Pieces of 4 Pounds each, as of Pieces of ½ Pounds, &c. each, What is the Number?

Anſ. 1455 Pieces and $\frac{6}{12}$ or ½ Piece of each Quantity.

TROY WEIGHT.

lb. *oz.* *dwt.* *gr.*
In 212 10 17 22 how many Grains?
12 Ounces 1 Pound.
2554 Ounces.
20 dwt. 1 Ounce.
51097 Penny-weights.
24 Grains 1 dwt.
204390
102195
1226350 Grains, Anſwer.

In 1226350 Grains, how many Pounds, &c.

```
                          2|0)
24)1226350(               5109'7
   120····               ───────
   ─────               12)2554 17
    26                ─────────────────────
    24                lb.  212   10   17   22
   ────               ═════════════════════
     235
     216
    ────
      190
      168
     ─────
     (22)
```

In 246 Ingots of Silver, each weighing 4 lb. $\frac{1}{2}$ *Troy*, how many Ounces? Anſwer 13284 Oz.

Out of 79680 *Oz.* of Silver, how many Snuff-boxes may be made, each to weigh 3 *oz.* $\frac{3}{4}$?
Anſwer 21237 Boxes, $\frac{9}{15}$ or $\frac{3}{5}$.

What Quantity of Gold muſt there be to make 674 Funeral Rings, each to weigh 3 *dwt.* 12 *grains*?
Anſwer 117 *Oz.* 19 *dwt.*

In 47624 Bars of *Spaniſh* Silver, each 36 *Oz.* $\frac{1}{4}$, how many Ounces? Anſwer 1726370 *Oz.*

How many Tankards, each to weigh 19 *Oz.* $\frac{1}{2}$ of Silver, may be made out of 8658 *Oz.*
Anſwer 444 Tankards.

CLOTH MEASURE.

Yds. qrs. Nls.
In 246 3 2 how many Nails?
4 *qrs.* 1 Yard.

987
4 Nails 1 Quarter.

Anſwer 3950 Nails.

In 426 Ells *Flemiſh*, how many Ells *Eng.*
3 *qrs.* 1 Ell *Flem.*

5 *qrs.* 1 Ell *Engliſh.* } 5)
1278 *qrs.*

Eng. Ells $255\frac{3}{5}$ *Anſw.*

Or you may multiply by 6 Half-Quarters, and divide by 10 Half-Quarters, which is ſhorter; becauſe in dividing by 10, you only cut off a Figure from the Dividend, and the Work is done.

In 5426 Ells *Flemiſh*, how many Yards?
3

4)16278

Anſ. $4069\frac{2}{4}$ or $\frac{1}{2}$ a Yard.

In 376 *French* Aulmns or Ells, how many Yards?
6 *qrs.* 1 *French* Aulmn.

4)2256

564 Yards, Anſwer.

In 47290 Ells *Flemiſh*, how many Ells *Eng.* and Yards?
Anſwer 28374 Ells *Eng.* 35467 Yds. $\frac{1}{2}$.

In 40 *Score of* Flemiſh *Ells, how many Ells of* French?
Twas given by a Prodigal unto a ſaucy Wench.
Anſwer 400 Ells *French.*

In 564 Yards, how many Aulmns?
4

6)2256

376 Anſwer and Proof, to 376 French Aulmns foregoing.

Ells *Engliſh* are reduced into Yards by adding $\frac{1}{4}$.

More Examples.

In 426 Ells *Engliſh*, how many Yards?
106–2 the $\frac{1}{4}$ to be added.

532–2 *Facit*.

On the contrary, Yards are brought into Ells *Engliſh* by ſubtracting $\frac{1}{5}$.

In 532 Yards $\frac{1}{2}$ how many Ells *Engliſh*?
106 the $\frac{1}{5}$ to be ſubtracted.

Anſwer 426 Ells *Engliſh*.

Ells *Flemiſh* are brought into Yards by deducting $\frac{1}{4}$.

In 5960 Ells *Flemiſh*, how many Yards?
1490 the $\frac{1}{4}$ to be ſubtracted.

Anſwer 4470 Yards.

Yards are reduced into Ells *Flemiſh* by adding $\frac{1}{3}$.

In 4470 Yards, how many Ells *Flemiſh*?
1490 the $\frac{1}{3}$ to be added.

Anſwer 5960

In 45 Packs of Cloth each 45 Pieces, and each Piece 45 Ells *Flemiſh*, how many Ells *Engliſh* and Yards?

Anſwer 54675 Ells.
68343$\frac{3}{4}$ Yards.

Ells *Flemiſh* are brought into Ells *Engliſh*, as expreſſed before *viz.* by multiplying by 6, and dividing by 10; or cutting off the laſt Figure or Cypher.

In 4920 Ells *Flemiſh*, how many Ells *Engliſh*?
6

10)29520

Anſw. 2952 Ells *Engliſh*.

Ells *Engliſh* are reduced into Ells *Flemiſh* by adding a Cypher, and dividing by 6, or by adding $\frac{2}{3}$.

In 4726 Ells *Engliſh*, how many Ells *Flemiſh*?

6)4726,0

Anſw. 7876 $\frac{4}{6}$ or $\frac{2}{3}$ Ells *Flem.*

Or thus:
4726 } The $\frac{2}{3}$
1575 $\frac{1}{3}$ } to be added.
1575 $\frac{1}{3}$

As before 7876 $\frac{2}{3}$

LIQUID MEASURE.

Tuns. Hhds. Gal.
In 65 2 24 how many Pints of Wine?
4 Hhds. a Tun.

262 Hhds.
63 Gall. 1 Hogſhead.

790
1574

16530 Gallons.
8 Pints 1 Gallon.

132240 Pints, *Anſwer.*

8)
In 132240 Pints of Wine, how many Tuns, &c.
4)
63)16530(262 Hogſheads.
126·· Hhds. Gallons.
T. 65 2 24
393
378
150
126
(24)

In 20 Tuns of Beer, how many Quarts?
4 Hogſheads 1 Tun.
80
54 Gall. 1 Hogſhead of Beer.
320
400
4320 Gallons.
4 Quarts 1 Gallon,
17280 Quarts, *Anſwer.*

54 Gallons make a Hogſhead of Beer, therefore to bring Firkins into Hogſheads, take $\frac{1}{6}$ Part, or divide by 6, and it quotes Hogſheads, becauſe 6 times 9, the Gallons in a Firkin make 54.

To bring Hogſheads into Barrels, add $\frac{1}{2}$, becauſe 18, the $\frac{1}{2}$ of a Barrel, and 36 the whole make 54, the Hogſhead. To bring Kilderkins into Hogſheads, divide by 3, becauſe 3 times 18 make 54. Barrels are brought into Tuns, by dividing by 7, as follows:

7)
In 420 Barrels, how many Tuns?
60

In 40 *Butts of curious Beer, by People called Stout,*
How many Quarts may thence be drawn, before thoſe
Butts are out? Anſwer 17280.

Examples.

Admit a Ship's Cargo from the *Canaries*, to be, *viz.* 250 Pipes, 130 Hogſheads, and 150 Quarter-Caſks; how many Gallons in all; and allowing every Pint to be a Pound, what is the Weight alſo?

Anſwer 44415 Gallons, 158 Tuns, 12 C. $\frac{1}{2}$.

In 444 Firkins of Ale, how many Pints?

Anſwer 28416.

In 74640 Pints of Beer, how many Barrels?

Anſwer $259\frac{6}{8}$.

In 45 Fats, or Vats of Rheniſh Wine, each of 242 Gallons, how many *Aumn* Caſks each 42 Gallons?

Anſwer $259\frac{12}{42}$.

Note, *Rheniſh Wine is ſold by the* Aumn, *of about* 42 *Gal.*

In 57 Pipes and 42 Gallons of *Madeira* Wine, how many Puncheons, Hogſheads, and Tierces?

Anſwer 86 *Pun.* 115 *Hhds.* 42 *Gal.* 172 *Tier.*

In 40 *Tuns, and* 50 *Butts, and* 60 *Pipes of Wine,*
How many Tierces do they make, admit they came from
Rhine? Anſwer 570.

DRY MEASURE.

Laſts. qrs. Buſh. Gall.
In 24 7 6 2 how many Gallons of Wheat?
10 Quarters, 1 Laſt.

247 Quarters.
8 Buſh. 1 Quarter.

1982 Buſhels.
8 Gallons 1 Buſh.

15858 Gallons.

In 40 Laſts of Barley, how many Combs?
Anſwer 800.

In 3228 Fats, or Vats of Sea Coal, how many Chaldrons and Scores?

Anſwer { 807 Chaldrons.
$30\frac{9}{91}$ Scores.

In 33 Weys of Salt, how many Quarters, Buſhels, and Pecks?

Anſwer { 165 Quarters.
1320 Buſhels.
5280 Pecks. }

In 20 *Laſts and* 30 *Weys of Corn, that's called Rye,*
How many Buſhels do they make, if you by Buſhel buy?
Anſwer 2800 Buſhels.

In 38880 Pecks of Sea-Coal, how many Chaldrons?
Anſwer 270.

LONG MEASURE.

In 50 Miles, how many Barley Corns in Length?
8 Furlongs 1 Mile.

400 Furlongs.
220 Yards 1 Furlong.

8000
800

88000 Yards.
3 Feet 1 Yard.

264000
12 Inches 1 Foot.

3168000 Inches.
3 Barley Corns 1 Inch.

9504000 Barley Corns in 50 Miles.

In 17490 Square Poles, how many Acres, &c.

16|0)1749|0(109 Acres.
16 . . .

149
144

40) 5|0(1 Rood.
4 .

(10)

	Acr.	Rood.	Poles.
Anſw.	109	1	10

Here is a ſmall Name to be brought into a great, and therefore it is performed by *Diviſion*; wherefore I divide the Square Poles by 160, the Square Poles in an Acre, and the Quotient is Acres, and the Remainder is Poles, which I divide by 40, the Square Poles in a Rood, and there comes but one Rood, or ¼ of an Acre, and 10 Poles remain. So the whole is 109 Acres, 1 Rood, and 10 Poles, as by the Work above.

TIME.

I deſire to know how many Days, Hours, and Minutes, there are ſince the Birth of our Saviour to this preſent Year.

1734
6 Hours wanting.

10404 Hours to be added.

Anno 1734. When an Edition of this Book was printed, and the altering the Date, would have been altering all the Work.

1734?
365 Days in a Year.

8670
10404
5202

632910 Days.
24 Hours in a Day.

2531640
1265820

15189840
10404 Hours added.

15200244 Hours.
60 Min. in an Hour.

912014640 Minutes.

Here in regard that there are 6 Hours loſt every Year, (for the Year conſiſts of 365 Days, 6 Hours nearly) I multiply the Years by 6, which produces 10404 Hours to be added to the Product of Hours.

Or it may be done thus: Bring a Year into Hours, in which you will find 8766, by which multiply that Number of Years; and that Product by 60, and the laſt Product will be the Anſwer; as by the following Work.

Days. Hours.
365 6 a Year.
24 Hours 1 Day.
1466
730
8766

1734 Years.
8766 Hours in a Year.
10404
10404
12138
13872
15200244 Hours ſince.
60
912014640 Minutes ſince.

From the 6th of *June* 1682, to the 15th of *Auguſt*, excluſive, 1721, how many Days; adding 9 Days for the Leap-Years, being 1 Day every 4th Year?

Anſwer 14313.

From the 19th of *Auguſt* 1701, to the 21ſt of *January* excluſive, $17\frac{17}{18}$, according to the O.S. (noting the Leap-Year) how many Days? Anſwer 5998.

Here follow ſome Queſtions, promiſcuouſly ſet for the Exerciſe of the Learner's Ability.

In 305 *l.* 12 *s.* 7 *d.* how many Halfpence?

Anſwer 146 02.

In 3192 lb. Weight, how many Hundred Weight?

Anſwer 28 *C.* ½.

In 3 *C.* ¾ of *Tobacco*, how many 12 lb. Boxes?

Anſwer 35.

In 270lb. 11 *oz.* 12 *dwt.* how many Penny Weights?
Anſwer 65032.

In 730 Rix-Dollars at 4*s.* 5*d.* $\frac{3}{4}$, how many Ducats at 4*s.* 4*d.*? Anſwer 754$\frac{118}{208}$ or 2*s.* 5*d.* $\frac{1}{2}$ over.

In 3 lb. 10 *oz.* of Gold, how many Mourning Rings, each 2 *dwt.* 12 *Grains*? Anſwer 368.

In 1260 Quarts, how many Hogſheads of Wine?
Anſwer 5 Hogſheads.

In 60 Kintals of Pruans, how many C. Weight, (a Kintal being 100 lb.) Anſwer 53 C. 2 *qrs.* 8 lb.

In 506 lb. 12 *s.* 2 *d.* how many *Portugal* Reas at 20 for 3*d*? Anſwer 810560$\frac{2}{3}$.

In 56 Boxes of Sugar, each 2 C. $\frac{3}{4}$, how many C. Weight? Anſwer 154.

In 4679 Yards, how many Ells *Eng.* Anſw. 3743$\frac{1}{5}$.

In 86 *l.* how many Guineas at 21 *s.* 6 *d*?
Anſwer 80 Guineas.

In 88000 Yards, how many Miles? Anſwer 50.

In 14703 Ells *Flemiſh*, how many Yards?
Anſwer 11027$\frac{1}{4}$ Yards.

In 75 C. 3 *qrs.* 24 lb. how many Pounds? Anſ. 8508 lb.

In 176 C. 2 *qrs.* 24 lb. Sugar at *Jamaica*, (the C. Weight being 100 lb.) how many C. Weight at *London*, the C. Weight being 112? Anſ. 157 C. 3 *qrs.* 6 lb.

In 6000 *French Crowns*, at 57 *d.* each, how many Pounds Sterling? Anſwer 1425.

In 34 *lb.* 6 *oz.* *Troy*, how many Ounces?
Anſwer 414 Ounces.

In Guineas 90, and in Piſtoles nine,
How many Pence, and what Sterling in Coin?

The Guineas at 21 *s.* and Piſtoles at 17 *s.*	Anſwer 24516 Pence, or 102 *l.* 3 *s.*

In 46 Packs of Cloth, each Pack 24 Pieces, and each Piece 42 Ells *Flemiſh*, how many Ells *Engliſh* and Yards?
Anſwer 27820$\frac{4}{5}$ *Eng.* Ells, and 34776 Yards.

How many Times does a regular Clock ſtrike in a Year? Anſwer 56940.

In 15420 *Vares* of *Valentia*, 100 of which make 85 Yards *Engliſh*, how many Yards and Ells *Engliſh*?

Anſw. $13050\frac{20}{85}$ or $\frac{4}{17}$ Yds. and 10472 Ells *Engliſh*.

CHAP. VII.

Of TARE *and* TRET, *&c.*

GROSS WEIGHT is the Weight of a Commodity, with the Weight of the Hogſhead, Cheſt, Caſk, Box, Wrapper, or any Thing elſe that contains the Goods: Or any Quantity given in *Hundreds*, *Quarters*, and Pounds in *Groſs Weight*.

TARE is an Allowance made by the Seller to the Buyer, for the Weight of the Hogſhead, Caſk, Cheſt, Box, Bag, *&c.* wherein the Goods are contained. And is ſometimes reckoned at ſo much *per* Bale, Bag, Barrel, Cheſt, *&c.* As in *Silks*, *Cotton*, *Raiſins*, *Capers*. At other Times at ſo much *per* C. as 10, 14, 16, or 24 *lb. per* C. There is alſo a Diſtinction of *Cuſtom-Houſe*, and *Invoice* Tare, as in *Tobacco's* and *Indigo's*, &c. and ſometimes uncertain, as in *Tobacco's* and *Sugars*, happening according to the Size of the Caſks.

TRET is an Allowance of 4 *lb.* upon every 104 *lb.* *Suttle*, claimed by Freemen of *London*, (and ſometimes to others alſo) and this is allowed for Waſte and Duſt, on ſome Sorts of Goods; as on *Tobacco's*, *Spices*, *Drugs*, &c.

CLOFF is an Allowance of 2 *lb.* upon every Draught above 3 C. Weight to the Citizens of *London*.

Neat Weight is what remains when the Allowances are deducted.

Example.

In 29 Bags of *Hops*, containing *Groſs* 88 C. 1 *qr*. 19 *lb*. *Tare* 4 *lb*. *per* C. how many C. neat?

	C.	*qrs.*	*lb.*
Groſs	88	1	19
Tare	3	0	17
Neat	85	1	02

C. *qrs*. *lb*.
88 1 19
4 lb. *per* C.
112)353 *Tare* (3C.
336
(17)

I multiply the given Hundred by 4, the *Tare* allowed for each Hundred, which produces with 1 *lb*. allowed for the Quarter 353 *lb*. *Tare*, which I divide by 112, and the Quotient gives 3 C. Weight, and 17 lb. remains, which I ſubtract from the *Groſs Weight*, and the Remainder is C. 85 1 02 for the Neat Weight. *See the Work.*

When the *Tare* is at ſo much *per* C. Weight multiply the *Groſs Weight* by the *Tare*, and divide the Product by 112, and the Quotient will be the *Tare*. Or ſubtract the *Tare per* C. from 112, multiply the *Groſs Weight* by the Remainder, divide the Product by 112, the Quotient gives the neat Weight. Or if you multiply the Pounds *Groſs* by the Pounds *Tare*, and divide by 112, the Quotient gives the Pounds *Tare*.

In 7 Bags of *Cotton*, each 2 C. ½, *Tare* 7 lb. *per* Bag, how many Pounds neat?

2½ C. each
7

17½
17
17
1756 the ½ C.

7 Bags.
7 *lb.* *Tare* each.

49 *lb.* *Tare.*

From 1960 *lb.* Groſs.
Subtract 49 *lb.* Tare.

Anſw. 1911 *lb.* Neat.

In 27 Bags of Pepper, containing
4 *lb.* Bag } Groſs *C. qrs. lb.*
——Tare } 58 3 11 Tare 4 *lb.* per Bag.
108 *lb.* Tare. 58
58
58,95 for 3 *qrs.* 11 *lb.*

[How many Pounds Neat?] 6591 Pounds Groſs.
108 Tare.

Anſw. 6483 Pounds Neat.

Three Hogſheads of *Tobacco*, Wt. *viz.*

N°. 1	*C* 5	1	17	Tare 90 *lb.*
2	6	2	10	87
3	5	3	20	85
	17	3	19	262

17
17
17
103 Odd Weight.

[How many Pounds neat?]

2007 Groſs Weight.
262 Pounds Tare.

Anſwer 1745 Pounds Neat.

Four Barrels of *Indigo*, qt. *viz.*

	C.	qrs.	lb.	lb.
No. 1 qt.	4	1	10	Tare 36
2	3	3	20	29
3	4	0	19	32
4	4	0	00	35
How many Pounds neat?	16	1	21	132

Anſwer lb. 1709.

Six Hogſheads of *Tobacco*, Wt. *viz.*

Tret 4 *lb.* per 104 lb. and *Cloff* 12 *lb.* How many Pounds neat?

	C.	qrs.	lb.	lb.
	4	3	21	Tare 76
	5	2	17	96
	6	1	20	100
	4	3	24	84
	7	1	13	102
	5	2	26	98
Groſs	35	0	09	556

35
35
35,9

3929 Pounds Groſs.
556 Pounds Tare.

3373 Pounds Suttle.
129½ Pounds Tret.

3243½ Reſt.
12 Cloff.

Anſwer 3231½ Neat Weight.

The *Tret* is always found by dividing the Suttle Pounds by 26; becauſe 4 times 26 is 104.

lb.
26)3373(129½
26
77
52
253
234
(19)

The Half-Pound in the *Tret* is allowed for the 19 Pound remaining.

In

2

In five Barrels of *Nutmegs* Wt. 18 C. $\frac{1}{2}$, 07 *lb.* *Groſs*, *Tare* 30 Pound *per* Barrel; and *Tret* 4 Pound *per* 104lb. how many Pounds neat?

	C.	*qrs.*	*lb.*	
30 *lb.* Tare	18	2	07	Groſs,
5 Barrels	18			
	18			
150 Tare	18,63			

2079 Pounds Groſs.
150 Tare   26)1929(74 lb. *Tret.*
1929 Reſt   182
74 Tret
    109
1855 *Anſwer*   104
    (5)

When the *Tare* is at ſo many Pounds *per Cent.* or 112*lb.* if it happen to be any Part of a Hundred Weight, it may be ſooner done by dividing the *Groſs Weight* by that Part, according to the Rule of *Diviſion* of ſeveral Denominations: As admit it be at 14 lb. *Tare per Cent.* then take the 8th Part of the *Groſs Weight*, or divide it by 8, becauſe 14 *lb.* is the 8th Part of a Hundred Weight, and the Quotient will be the *Tare* in *Groſs Weight*, which ſubtract from the firſt *Groſs Weight*, and the Remainder will be the *Neat Weight*.

Example.

	C.	*qrs.*	*lb.*	
20 Bags, *qt.* (8)	48	1	24	*Groſs*, *Tare* 14 *lb.* per C.
	6	0	06$\frac{1}{2}$	*Tare.*
Facit	C. 42	1	17$\frac{1}{2}$	*Neat Weight.*

Here I ſay, the Eights in 48, 6 times; then the Eights in 1, 0 times, but turning it into Pounds, that is 28, and

24 in the Place of Pounds make 52; then the Eights in 52, 6 times, and there reſts 4, which I multiply by 4, the Quarters in a Pound, and they make 16; then the Eights in 16, twice, or ½ a Pound. So the *Tare* is 6 *C.* 0 *qrs.* 06 *lb.* ½, which I ſubtract from 48 *C.* 1 *qr.* 24 *lb.* and the Remainder 42 *C.* 1 *qr.* 17 *lb.* ½, for the Neat Weight; as by the Work above.

If the *Tare* be 16 *lb. per Cent.* then divide the *Groſs Weight* by 7, becauſe 16 *lb.* is the 7th Part of a Hundred Weight.

Example.

12 Hhds.	*C.*	*qrs.*	*lb.*	
qt. (7	59	3	14	at 16 *lb.* per Cent.
Tare	8	2	06	the 7th Part.
Neat Wt.	51	1	08	

If the *Tare* be 18 *lb. per Cent.* then for 16 Pounds work as in the laſt *Example*; and for the two Pounds take the 8th Part of the Quotient, and add them together for the whole *Tare*.

If the *Tare* be 20 *lb. per Cent.* then for the 16 Pounds work as before; and for the 4 Pounds, take the 4th Part of the Quotient, and add them together for the whole *Tare*.

If the *Tare* be 8, 10, or 12 *lb. per Cent.* or any leſſer Number; then take the Half of the *Groſs Weight*, which will make it Half Hundreds; then 8 *lb.* is the 7th Part of ½ *C.* 10 *lb.* is divided into the 7th Part, and 4th of that 7th Part; 12 *lb.* into the 7th Part, and Half of that Part, &c.

Oil is entered at the *Cuſtom-Houſe* by the Gallon, and pays Duty accordingly; yet in uncertain Caſks it is weighed, and the Tare allowed is 18 *lb. per C.* which being deducted, is computed at 7 *lb.* ½ *per* Gallon; and reduced thus: Multiply by 94. (that being the Neat Weight of 112) and the Product is the Neat Pounds, which doubled brings them into Half Pounds, which divide by 15, the Half Pounds in 7 Gallons and $\frac{1}{2}$, the Quotient gives the Content in Gallons, which if divided by 252, gives Tuns, &c.

Example.

C. *qrs.* *lb.*
Reduce 124 3 16 into Gallons.
94
496
1116
100
11756 *Pounds.*
2
Half Pounds 15)23512(1567$\frac{7}{15}$ Gallons.

Oil in certain Caſks, 1 in 20 is allowed for Leakidge, but under 10 none.

In *Candy* Barrels the Tare is 29 *lb.* *per* Barrel; and from *New-England* 50 *lb.* *per* Barrel.

In 46 *C.* of *Pruans*, Tare 16 *lb.* *per* C. how many *C.* Neat? Anſwer 39 *C.* 1 *qr.* 20 *lb.*

Admit 50 Barrels of *Oil* from *New-England*, to contain

122 C. 3 *qrs.* 12 *lb.*

122

122

122,96

13760 Pounds.

2500 Tare.

11260 Neat.

11260

15)22520 Half Pounds.

Anſw. 150 ⅓ Gallons.

Or Pounds of *Oil* are reduced into Gallons by multiplying the Neat Pounds by 2, and dividing that Product by 3; and that Quotient again by 5, gives the Neat Gallons of 7 *lb.* ½ *per* Gallon.

TARES.

	C.		C.	
Tare of Sugars from	8	to	12	1
	12		15	1¼
	15		17	

Alom in Caſks 12 *lb. per* C.

Pot-Aſhes 10 *ditto.*

Argil or *Argol* in Caſks, 14 *ditto.*

Almonds in Bags, 14 *ditto.*

Raiſins in Frails or Baſkets. 14 *lb. per* Frail.

Oil 18 *lb. per* C.

Madder in Bales, 28 *lb.* Tare *per* Bale,

Ditto in Fats, or Vats, 10 *lb. per* C.

Many more Examples might be offered, but thoſe foregoing I think are ſufficient for the Service and Improvement of any ingenious Perſon.

CHAP. VIII.

The GOLDEN RULE,

Or, Rule of Three *Direct.*

THIS is called the *Rule of Three,* from its having Three Numbers to work with, to find a Fourth in Proportion to them; which Fourth Number is the Anſwer to the Queſtion.

It is alſo called the *Golden Rule,* from its excellent Uſe and Performance in *Arithmetic.*

And ſometimes the *Rule of Proportion,* becauſe the Fourth Number bears the ſame Rate or Reaſon to the Third, as the Second does to the Firſt.

I. Obſerve that of the three given Numbers in any Queſtion in this *Rule,* you have two of them always of one Name, or Kind; that is, if one be *Money,* ſo is the other; or if one be *Weight,* the other is ſo alſo: And one of which Numbers muſt be the Firſt Number in ſtating, and the other the Third, and that muſt always be the Third which moves the Queſtion, and the other of the ſame Kind, muſt be the Firſt Number; and the other Number, which is of another Denomination, always poſſeſſes the middle Place, and is evermore of the ſame Kind with the Anſwer, or Fourth Number ſought As for *Example,*

If 12 Ells of *Holland* coſt 36 *s.* what will 456 Ells coſt at that Rate?

Here in ſtating the Queſtion for the Work, 456 muſt be the third Number; becauſe that is the Number that aſketh the Queſtion; for 'tis required to know what will

456 Ells coſt? And the other Number of the ſame Name, is to be the firſt, which here is 12; and the laſt Number, which is, of the ſame Kind with the Number ſought, or Anſwer to the Queſtion, poſſeſſes the middle Place, and when ſtated for the Working ſtands thus:

	Ells.		*s.*		*Ells.*	
If	12	coſt	36	what	456	?

II. Whenever it happens, that either one or both of the extreme Numbers, be of divers Denominations, they muſt be reduced into the loweſt Name mentioned; that is, if they be Pounds, Shillings, and Pence, or C. qrs. and lb. then they muſt be reduced into Pence, or Pounds Weight. And if one of the Extremes be of ſeveral Denominations, and not the other, yet muſt both be reduced into one Name; that is, if one conſiſts of Pounds, Shillings, and Pence, and the other only of Pounds, yet that Number which is only Pounds, muſt be brought into Pence as well as the other, that the firſt and third Numbers may be of like Name, which always muſt be; that is, if the firſt Number be Feet, the third Number muſt be Feet likewiſe; and if one be Gallons, the other muſt be Gallons alſo, *&c.* as was ſaid before. If the middle Number be of divers Denominations, it muſt be reduced into the loweſt Name mentioned therein, (or lower if there's Occaſion) as well as the firſt or third Numbers.

III. When the Numbers are diſpoſed in ſuch Order, as before directed, and ſtated accordingly, then multiply the ſecond and third Numbers together; that is, the third by the ſecond, or the ſecond by the third, (it being all one) and divide that Product by the firſt Number, and the Quotient of that Diviſion will be the Anſwer, and in the ſame Name with the middle Number; that is, if the middle Number be Shillings, ſo will the Quotient alſo. Or if the middle Number be Pence, or Farthings, ſo likewiſe will be the Quotient, or Anſwer.

For the better underſtanding the foregoing Notes and Directions, I ſhall compriſe them under thoſe ſhort Heads following, *viz.*

1. That muſt be the third Number, which aſketh the Queſtion.

2. Firſt and third Numbers muſt be of one Name, or ſo reduced.

3. The middle Number, if of divers Denominations, muſt be brought into the loweſt mentioned; or lower, if Occaſion require it.

4. Multiply the ſecond and third Numbers together, and divide that Product by the firſt Number, and the Quotient thence ariſing, will be the Anſwer to the Queſtion, in the ſame Name you left your middle Number in.

The fourth Number, or Anſwer to the Queſtion, if in a direct Proportion, may be found theſe three ſeveral Ways, *viz.*

(1.) By multiplying the ſecond and third Numbers together, and dividing the Product by the firſt, and the Quotient will be the Anſwer: As in the 4th Direction above.

(2.) By dividing the ſecond Number by the firſt, and then multiplying that Quotient by the third, and that Product will be the Number ſought.

(3.) By dividing the third by the firſt, and then multiplying that Quotient into the ſecond Number, and that Product will be the Anſwer.

Tho' all theſe Ways be equally true, and the two laſt very conciſe, when either the ſecond or third Terms may be divided by the firſt, yet the firſt is moſt in uſe.

N. B *When the firſt Term is an Unit, the Anſwer is found by* Multiplication *only. When the ſecond or third Term is an Unit, then the Anſwer will be found by* Diviſion *only.*

Example

Example 1.

If 12 Ells of *Holland* coſt 36 Shillings, what will 456 Ells coſt at that Rate?

The Numbers being ranked according to the Directions given in the firſt Rule of this Chapter, they ſtand thus:

```
     El's.      s.      Ells.
  If 12 coſt 36, what 456?
                       36 Second Number.
                     -----
                      2736
                     1368
                    ------
The firſt Number, 12)16416
                    ------
                  2|0) 136|8
                    ------
              Anſwer l. 68 08
                    ------
```

Here (according to Rule) I multiply the third Number 456 by 36, the ſecond Number, and the Product is 16416, which I divide by 12, the firſt Number, and the Quotient is 1368, which are ſo many Shillings; becauſe the middle Number was left in Shillings: Then thoſe Shillings in the Quotient I bring into Pounds, according to the Rule given in *Reduction*, Page 129, by cutting off the Figure towards the Right-hand, and halving thoſe towards the Left, and the Anſwer is 68 *l.* 8 *s.* as may be ſeen in the Work above.

Example 2.

If 456 Ells of *Holland* coſt 68 *l.* 8 *s.* what will 12 Ells coſt at that Rate? *Stated thus as follows:*

Ells. *l.* *s.* *Ells.*
If 456 coſt 68 8, what 12?
20

1368
12 Third Number.

Firſt Number 456)16416(36*s.* Anſwer.
1368

2736
2736

(0)

Here the Queſtion lies upon 12 Ells; for it is aſked, *What will* 12 *Ells coſt?* Therefore in the ſtating it is the third Number, (as it is alſo in the Queſtion, but ſometimes it does not ſo happen, that the Numbers in a Queſtion lie in ſuch Order as they ought to do in ſtating) and the other of the ſame Name is the firſt, *viz.* 456; and the middle Number is of the ſame Name you ſeek for, *viz.* Money, for we want to know how much Money 12 Ells will coſt; but here the middle Number is of more Denominations than one, *viz.* of Pounds and Shillings; and therefore it is brought into the loweſt Name mentioned, to wit, Shillings. Then I multiply the ſecond and third Numbers together, and divide their Product by the firſt, and the Quotient is the Anſwer, *viz.* 36*s.* and is a Proof to the firſt *Example.* And ſo may any Queſtion be proved by ſtating it reverſely, or otherwiſe varying the Queſtion ſeveral Ways.

IV. If after you have divided the Product of the ſecond and third Numbers multiplied together by the firſt Number, any Thing remains, the Value of that Remainder may be found, by multiplying the ſaid Remainder by the Parts of the next inferior Denomination, that are equal to one of the Quotient: That is, ſuppoſe the Quotient is Shillings, and there is a Remainder,

mainder, that Remainder muſt be multiplied by 12, becauſe 12 of them, *viz.* Pence (the next lower Denomination) make one of the Quotient, to wit, a Shilling, and divide that Product by your former Diviſor the firſt Number, and the Quotient will be the Value of that Remainder, in the Parts aforeſaid. And if any yet remain, it muſt be multiplied by the Parts of the next inferior Denomination, that are equal to an Unit of the laſt Quotient, and ſtill divide by the ſame Diviſor, *&c.* And ſo muſt you proceed till nothing remains, or till you have brought it as low as you deſire.

Example 3.

If one Hundred Weight of Currants coſt 2*l.* 9*s.* 6*d.* what will 45C. 3*qrs.* 14*lb.* coſt at that Rate? *State as follows.* Not work'd in this Page, but in 176.

```
   lb.      l. s. d.       C. qrs. lb.
If 112 cost 2  9  6, what 45  3  14?
            20             4
           ----          -----
            49            183
            12             28
           ----          -----
           594 2d Num.   1468
           ----           367
                         -----
                         5138 Third Number.
                          594 Second Number.
                         -----
                         20552
                        46242
                       25690
                      --------12)
The first Number 112)3051972(27249 Pence.
                     224....  -----
                     ----     2|0)227|0-9d.
                      811     ----- ---
                      784 Anſ. l. 113-10-9d. ¾.
                      ----   -------------
                       279
                       224
                      ----
                        557
                        448
                       ----
                        1092
                        1008
                        ----
                          84 Remainder.
                           4
                        ----
                    112)336(¾
                        336
                        ----
                        (0)
```

Here the third Number is brought into the loweſt Name mentioned, *viz.* Pounds; therefore the firſt Number, 1 Hundred Weight, muſt be in Pounds alſo. Likewiſe the middle Number is brought into the loweſt Name mentioned in that. Then the ſecond and third Numbers are multiplied together, and that Product divided by the firſt; and the Quotient is Pence, becauſe the middle Number was reduced into Pence, then the Pence in the Quotient are brought into Pounds by *Reduction*; and they make 113 *l.* 10 *s.* 9 *d.* But there is a Remainder of 84; wherefore I conclude that makes ſomething more; therefore I multiply that Remainder by 4, the Parts of the next inferior Denomination, and divide that Product by the former Diviſor, *viz.* 112, and it quotes 3, which is three Farthings, and nothing remains. So that the whole is 113 *l.* 10 *s.* 9 *d.* $\frac{3}{4}$. See the Work.

Example 4.

If 15 Weeks Pay comes to 2*l.* 12*s.* 6*d.* what is that a Year? *Stated thus:*

```
             Weeks.      l.  s.  d..    Weeks.
          If 15 give     2  12   6, what 52?
                        20
                       ----
                        52
                        12
                       ----
                       630 2d Number.
                        52 3d Number.
                       ----
                      1260
                     3150
                    ------    12)
1ſt Number 15)32760(  2184 Pence.
                    30...
                  ------    2|0)18|2
                       27    ------
                       15     l. 9 2
                  ------     ------
                      126
                      120
                     ----
                       60
                       60
                     ----
                      (0)
```

Example 5.

If one Ounce of Silver be valued at 5*s.* 2*d.* what is the Value of 240 Ounces 15 dwt.

If 1 *oz.* coſt 5*s.* 2*d.* what 240 *oz.* 15 *dwt.*

20 $\frac{12}{62}$ 20

20 Penny Wts. 4815 Penny Weights.

62, 2d Number.

9630

28890

1ſt Number, 2|0)29853|0

10 Rem. 12)14926$\frac{10}{20}$

4 Farth.

2|0)124|3–10*d.*

20|)4|0

Anſw. *l.* 62–3–10½.

2 *qrs.*

Example 6.

If a Tun of Wine coſt 56 *lb.* 14 *s.* what coſts a Quart?

Hbds. *l.* *s.* *qt.* *d.*

If 4 56 14 1 1008)13608(13½ Anſ.

63 20 1008

252 1134 3528

4 12 3024

1008 *qts.* 13608 Pence. 504

4

1008)2016(½

2016

(0)

Here the middle Number is reduced lower than is mentioned, that being but Shillings, but I have brought it into Pence, becauſe I would have the Anſwer the ſooner, by not having ſo many Remainders to reduce lower. Here alſo the ſecond and third Numbers are not multiplied together, becauſe they would only produce the ſame Figures again; wherefore I only divide the ſecond Number by the firſt, and the Quotient is the Anſwer in Pence, agreeable with the middle Number, and the Remainder 504, I multiply by 4, and divide again by 1008, according to the Rule, and the Quotient produces two Farthings more, to be joined to the 13 *d.* ſo the Anſwer is 13 *d.* ½ the *Quart*, as by the Work may be ſeen.

Example 7.

Suppoſe my Salary be 73 Pounds a Year, what is that a Day?

```
   Days.    l.    Days.
If 365 give 73 what 1?
            20
          ------
365)1460(4s. per Day Anſwer.
    1460
    ----
     (0)
```

Here the Year is brought into Days, that the firſt Number may agree with the third; and here alſo, I do not multiply by 1, for the Reaſons abovesaid (for an Unit of itſelf neither multiplies nor divides) and I cannot divide 73 by 365, wherefore I bring the Pounds into a lower Denomination, *viz.* Shillings, or lower, if there be occaſion. Then I divide according to Rule, and the Quotient gives 4 *s.* the Day for Anſwer, agreeable to the ſecond Aſſertion of *N.B.* in Page 172.

Example 8.

Nutmegs at 4*d.* ½ *per* Ounce, what is that the C. Wt.

```
      oz.    d.         lb.
If    1  coſt 4½, what  112 ?
             4           16
            ---         ----
            18          672
                       112
                       ----
                       1792 Ounces.
                         18 2d Number.
                       -----
                       14336
                       1792
                       ------
                     4)32256(
                     --------
                    12)8064
                     --------
                    2|0)67|2
                     --------
                       33–12 Anſwer.
                     --------
```

Here the middle Number is reduced into the loweſt Name mentioned, *viz.* Farthings, by which I multiply the third, and the Product is Farthings; and according to Rule, I ſhould divide by the firſt Number, but the firſt Number being but 1, it neither multiplies nor divides, (as was ſaid before) and therefore the Quotient, or 4th Number, is the ſame with the Product of the ſecond and third, which is Farthings; becauſe the ſecond Number was Farthings, which are reduced into Pounds, as above.

I ſhall now ſhew that many times Queſtions in this Rule may be contracted, and much ſooner wrought by another Method of working; that is, only by following the brief Methods of *Multiplication* and *Diviſion*, ſufficiently ſhewn in the 4th and 5th Chapters of this Book.

Example

Example 9.

If 5 Gallons of Brandy coſt 1*l.* 6*s.* 8*d.* what will 63 Gallons, or a Hogſhead, coſt at that Rate?

The common Way.

G. *l. s. d.* G.
If 5——1 6 8——63
20
26
12
320 2d Numb.
63 3d Numb.
960
1920
5)20160
12)4032 Pence.
2|0)33|6
l. 16–26 Anſwer.

The ſhorter Way.

G. *l. s. d.* G.
If 5——1 6 8——63
9
12 0 0
7
1ſt Numb. 5)84 0 0
Anſw. *l.* 16 16 0

In working by the ſhorter Way, I do not reduce the middle Number at all, but multiply according to the 14th Rule of the 4th Chapter of this Book, by 7 and 9, they multiplied together making the Quantity 63, which Product I divide by 5, the firſt Number, according to the 10th Rule of the 5th Chapter, and the Quotient is the Anſwer, *viz.* 16*l.* 16*s.* as in the common Way. Here in this ſhort Method, the Rule of Stating and Working is followed, as in the common Way; for the ſecond and third Numbers are multiplied together, and their Product divided by the firſt; but there is above 20 Figures Difference between one Way and the other.

Example 10.

If the Wages of 3 Weeks comes to *2l.* 3*s* 6*d*. what is a Year's Wages at that Rate?

Common Way.	*Short Way.*
W. *l.* *s.* *d.* *W.*	*W.* *l.* *s.* *d.* *W.*
If 3——2 03 6——52	If 3——2 03 6——52
20	10
43	21 15 0
12	5
	W.
522 Second.	108 15 0 50
52 3d. *l.* 2–03–6	M. by(2) 4 07 0 2
1044	1ſt N. 3) 113 02 0 52
2610	
	Anſwer *l.* 37 14 0
3)27144	
12`904–8 Pence.	
2|0)75|4	
l. 37 14 Anſwer.	

After I have multiplied by 10, and by 5, which make Fifty, I multiply *2l.* 3*s*. 6*d*. the middle Number, by 2, which is wanting, and add them together.

How many Yards were in that Piece of Cloth that coſt *l.* 14–12–6, the Yard being valued at 7*s*. 6*d*.

Anſwer 39 Yards.

Example 11.

If 56 *lb.* of Coffee coſt 21 *l.* 11 *s.* 8 *d.* what will 3 *lb.* coſt at that Rate?

Common Way.

lb. *l.* *s.* *d.* *lb.*
If 56——21 11 8——what 3?
20
——
431
12
——
5180 Second,
3 Third.
————12)
56)15540(277
112 ——
—— 2|3–1–½
434 ——
392 *l.* 1–03–1½ Anſw.
——
420
392
——
28 Remainder.
4
——
56)112(2
112
——
(0)

Shorter Way.

If 56——21 11 8——3
3
————
7)64 15 0
————
8) 9 05 0
————
Anſw. *l.* 1 03 1½
————

Here I divide by the firſt Number at twice, according to the 11th Rule of the Vth Chapter. Here is above 30 Figures Difference.

Example 12.

If the Freight of a Ship be 529*l.* 11*s.* what muſt be given to A. B. for his $\frac{5}{32}$ Parts?

Pts. *l.* *s.* *Pts.*
If 32—give 529 11 ——what 5?
20
10591
5
20)
32)52955(165|4
32
209
192
Anſ. *l.* 82 14 10 $\frac{4}{32}$, or $\frac{1}{8}$, or half a (Farth.
175
160
Pts. Short Way. *Pts.*
155 32——*l.* 529 11——5
128 5
Rem. 27 4)2647 15
12
8) 661. 18 9
32)324(10
32 Anſw. *l.* 82 14 $10\frac{1}{2}$ a Farth.
Rem. (4)
Here is almoſt 40 Figures Difference.
32

For 3 Weeks Board I pay 11 *s.* 3 *d.* What is that a Year?
Anſwer *l.* 9 15.

Example

Example 13.

If 72 C. of Starch coſt 63 *l.* what will 15 *C.* at that Rate?

C. *l.* *C.*
If 72——63——15

Work as uſual, *&c.*
Anſwer *l.* 13-2-6.

Short Way.

C. *l.* *C.*
If 72——63——15
3
189
5
8)945
$9)118\frac{1}{8}$ of a *l.*
l. 13 : 2 : 6

⁂ Note, *If at any time we know what Part the ſecond Number is of the firſt; the ſame Part alſo will the 4th Number (or Anſwer) be of the third.* As for Example.

If 10 *s.* gain 2 *s.* what 100 *l.* Anſwer 20 *l.* Which is the 5th Part of 100, as 2 is of 10.

Another Short Way.

There is another Way of contracting Queſtions in this Rule, *viz.* by dividing the third Number by the firſt, and by that Quotient to multiply the ſecond, which Product or Products, will be the Anſwer; as in the following Examples.

Example

Example 14.

If 8 Yards of Cloth coſt 4 *l.* 10 *s.* 8 *d.* what will 24 Yards coſt at that Rate?

Common Way.

Yards. *l.* *s.* *d.* *Yards.*
If 8——4 10 8——24?
20
——
90
12
——
1088
24
——
4352
2176
————
8)26112
————
12)3264
————
2|0)27|2
————
Anſw. *l.* 13 12

Second ſhort Way.

Yards. *l.* *s.* *d.* *Yards.*
If 8——4 10 8——24 (3 Q.
3
————
Anſwer *l.* 13 12 0

Here I divide 24, the third Number, by 8, the firſt Number, and it quotes 3; by which I multiply 4 *l.* 10 *s.* 8 *d.* the middle Number, and the Product is the Anſwer, *viz.* 13 *l.* 12 *s.* 0 *d.* as before. But if the Queſtion had been ſtated contrariwiſe, *viz.* If 24 *Yards* coſt 13 *l.* 12 *s.* what 8 *Yards?* Then you might have done it by the other ſhort Way, as follows.

Yards. *l.* *s:* *Yards.*
If 24 coſt 13 12, what 8?
8
8)108 16
3) 13 12
Anſw. *l.* 4 10 8

3) Or thus:
l. 108 16
8)36 05 $\frac{1}{3}$
As before *l.* 4 10 8

Or divide the firſt Number (when that is greateſt) by the 3d, and by that Quotient divide the 2d, and that laſt Quotient is the Anſwer, as under.

Yards. *l.* *s.* *Yards.*
If 24——coſt 13 12——what 8?
3 3)4 10 8 Anſwer.

When any thing remains (in the ſecond ſhort Method) after you have divided the third Number by the firſt, then the firſt and third Numbers are not proportional; for if they be, there will remain nothing. In this Caſe, I ſay, when any thing remains, you muſt, after you have multiplied the middle Number by the Quotient or whole Number; then multiply alſo the middle Number by the *Numerator* of the Fraction in its loweſt Terms, and divide that Product by the *Denominator*, and add that Quotient to the former Product of the ſecond Number multiplied by the Quotient, or whole Number aforeſaid. An *Example* or two will make it eaſy to be underſtood.

But before I proceed, 'twill be neceſſary a little to explain the Meaning of the *Numerator* and *Denominator* of a Fraction, and how to reduce it into its loweſt Terms.

A Fraction, or Part of a whole Number, ariſes from *Diviſion*; and what remains after the *Diviſion* is ended, is the *Numerator*, and the *Diviſor* is the *Denominator*. As ſuppoſe your Diviſor is 12, and your Remainder 4, the 4 is the *Numerator*, and 12 the *Denominator*; and if ſet *Fraction-wiſe*, ſtand as follows:

Re-

$$\frac{\text{Remainder } 4 \text{ Numerator.}}{\text{Diviſor } 12 \text{ Denominator.}}$$

And to reduce this (or any other Fraction) into its loweſt Terms, halve the Numerator, and alſo the Denominator; or divide them by 3, 4, 5, *&c.* or by any of the 9 Digits; that nothing remain in either; for that Figure which divides one without a Remainder, may not do ſo by another, but you muſt divide both Numerator and Denominator by ſuch a Number as leaves no Remainder in either. But if you cannot do ſo, then is the Fraction in its loweſt Terms already.

Example.

Reduce the afore-mentioned Fraction $\frac{4}{12}$ into its loweſt Terms.

$$\tfrac{1}{2}\left\{\frac{4}{12}\right\}\frac{2}{6}\left\{\frac{1}{3}\right\}\textit{Loweſt Terms.}$$

$$\tfrac{1}{4}\left\{\frac{4}{12}\right\}\left\{\frac{1}{3}\right\}\textit{Loweſt Terms.}$$

Here I reduce it, by dividing it by 2, or halving it, ſaying the half of 4 is 2, and the half of 12 is 6: Then again the half of 2 is 1, and the half of 6 is 3; which is as far as I can go, and the Fraction is reduced into its loweſt Terms, *viz.* $\frac{1}{3}$. But if I divide it by 4, it reduces it ſooner; for I ſay the 4's in 4 once, and the 4's in 12, 3 times: And ſo it is reduced at once into $\frac{1}{3}$, as *per* Work. And this $\frac{1}{3}$ is equal in Value with $\frac{4}{12}$, for as 1 is the 3d Part of 3, ſo is 4 of 12.

Example

Example 15.

If in 15 Weeks I ſpend 5*l.* 5*s.* what is that a Year?

The common Way.

W. *l.* *s.* *W.*
If 15—5 5—52?
20
105
52
210
525
2|0)
15)5460(36|4
45
*l.*18–4 Anſwer.
96
90
60
60
(0)

Short Way.

W. *l.* *s.* *W.*
If 15—5 5—52)$3\frac{7}{15}$
3
15 15
2 9
Anſw. *l.* 18 4

l. *s.*
3)36 15
5)12 05
2 09

Here I divide 52 the 3d Number, by 15 the firſt Number, and it quotes 3, and the Remainder is 7, by which 7, after I have multiplied by 3, I multiply by *l.* 5–5, the middle Number, and the Product is 36–15, which I divide by 15, the firſt Number, at twice, and the laſt Quotient is *l.* 2–9, which is $\frac{7}{15}$, Seven Fifteenths of *l.* 5–5, which is added to the *l.* 15–15 the Product of *l.* 5–5, multiplied by the Quotient 3, and they make *l.* 18–4, as by the common Way. See the Work.

Example 16.

If 45 *l.* buy 15 *C.*$\frac{3}{4}$ 12 *lb.* of *Mather*, what will 200 *l.* buy at that Rate?

Common Way.
l. C. *qrs. lb.* *l.*
If 45—15 3 12—200

Anſ. 70 1 25

C. *qrs.* *lb.*
The $\frac{4}{9}$ of 15 3 12

Short Way.
l. C. *qrs. lb.* *l.*
If 45—15 3 12 200(4
4 180

63 1 20 } (20
5—$\frac{4}{9}$
7 0 05 } (45

70 1 25 Anſwer.

C. *qrs.* *lb.*
45)355200(7893(70 1 25 Anſwer.

Here I divide the third Number 200, by 45, the firſt Number, and it quotes 4, by which I multiply the middle Number *C.* 15 3 12, and the Product is *C.* 63–1–20. But there is a Remainder of $\frac{20}{45}$, which in its loweſt Terms, is 4 Ninths; wherefore I take the $\frac{4}{9}$ of the middle Number, that is, by multiplying by 4, and dividing by 9, according to Rule, and there is produced *C.* 7–0–5 more, to be added to *C.* 63–1–20, and the Total is *C.* 70–1–25.

Example 17.

If 26 Yards of Broad Cloth coſt *l.* 12–2–8, what will 248 Yards coſt at that Rate?

Yds. *l.* *s.* *d.* *Yds.*
26 —— 12 2 8 —— 248 ?
20

242
12

2912 *Ayre's* Arith.
248 *page* 105.

23296
11648
5824
12)
26)722176(27776] *l.* 115–14–8 Anſwer.

Shorter Way.

If 26———12 2 8———248(9

9 234

109 04 0 14|7

$\frac{7}{13}$6 10 8

26|13

l. 115 14 8 Anſwer

13)84 18 8

To be added 6 10 8

Example 18.

If 27 Acres of Land lett for 17*l.* 10*s.* what will 135 Acres come to at that Rate?

Acres. *l.* *s.* *Acres.*

If 27———17 10———135

20

350

135

1750

1050

350

———2|0)

27)47250(175|0

27···

——*l.* 87 10

202

189

135

135

(0)

Shorter Way.

If 27——17 10——135(5

5 135

Anſw. *l.* 87 10 (0)

Thus by one of theſe ſhort Ways, may moſt Queſtions in this Rule be anſwered, and much Time, and many Figures ſaved. I ſhall now only add ſome Queſtions with their Anſwers, for the Learner's Practice.

19. If 18 Yards $\frac{1}{4}$ of Serge coſt 2*l.* 5*s.* how many Yards of the ſame may I have for 300 Guineas at 21*s.* 6*d.* each ? Anſwer 2687$\frac{1}{2}$ Yards.

20. If 37 Acres of Land lett for *l.* 13–11–4, what is that an Acre ? Anſwer 7*s.* 4*d.* *per* Acre.

21. If I have an Eſtate of 470*l.* *per Annum*, what may I expend daily, and yet lay up yearly 130 *l.* Anſwer 18 *s.* 7 *d.* $\frac{1}{2}$ $\frac{90}{365}$.

22. How many Dozen of Stockings at 11 Groats *per* Pair, may I buy for *l.* 190–12 ? Anſ. 86 Doz. 7 Pr. $\frac{28}{44}$.

23. Bought 6 Cheſts of Sugar, each 6 *C.* $\frac{3}{4}$, at 56 *s.* *per C.* what come they to ? Anſwer *l.* 113–8.

24. Sold a Piece of Cloth, *qt.* 29$\frac{1}{2}$ Yards, for *l.* 5–17, what is that *per* Ell *Engliſh* ? Anſwer 4*s.* 11*d.* $\frac{1}{4}$ $\frac{114}{118}$.

25. *A.* owes *B.* *l.* 296–17, but he compounds for 7*s.* 6*d.* in the Pound, what muſt *B.* receive for his Debt ? Anſwer *l.* 111–6–4$\frac{1}{2}$.

26. If the Intereſt of 100 *l.* for a Year comes to 6*l.* what is the Intereſt of *l.* 315–12–6, for the ſame time ? Anſwer *l.* 18–18–9.

27. Bought a Caſk of Wine for *l.* 62–8, how many Gallons were in the ſame, when the Gallon was valued at 5*s.* 4*d* ? Anſwer 234 Gallons.

28. What comes the Commiſſion to, of *l.* 490–12, at *l.* 2$\frac{1}{2}$ *per Cent* ? Anſwer *l.* 12–5–3$\frac{1}{2}$.

29. If the whole of a Ship coſt *l.* 1270–10, what doth 3$\frac{1}{2}$ Parts come to at that Rate ? Anſwer *l.* 119–2–2$\frac{1}{4}$.

30. If *A.* owes *B.* *l.* 395–18, but compounds the whole Debt for *l.* 100–12, what is that iu the Pound ? Anſwer 5*s.* 1*d.* almoſt, or 5*s.* 0$\frac{3}{4}$, $\frac{7446}{7918}$.

31. What comes *C.* 19 2 *qrs.* 12 *lb.* of Sugar to, at 5*d.* $\frac{1}{2}$. *per* Pound ? Anſwer *l.* 50–6–6.

32. Arrived from *Turkey* 246 Bales of *Tripoly Belladine* Raw Silk, weighing one with another, *C.* 2$\frac{3}{4}$, at 5*s.* 6*d.* the Pound, of 24 Ounces, what do they amount to ? Anſwer *l.* 46723–12 *s.*

33. If I have *l.*214 a Year, what is that for 19 Weeks? Anſwer *l.* 78-3-10$\frac{8}{52}$.

34. What comes the Inſurance of *l.* 642-12-6 to, at 4 Guineas *per Cent.* the Guinea at 21*s.* 6*d.* Anſwer *l.* 27-12-7$\frac{1}{2}$.

35. If I buy 100 Yards of Ribbon, at 3 Yards for a Shilling, and 100 of *ditto*, at 2 Yards for a Shilling, and ſell it again for 2 Shillings the 5 Yards, the Queſtion is, *Whether I get or loſe, and how much?* Anſwer I loſe 3*s.* 4*d.*

36 Shipt for *Jamaica*, 550 Pairs of Silk Stockings at 11*s.* 6*d.* *per* Pair, and 460 Yards of Stuff, at 14*d.* *per* Yard; in Return of which I have had *C.* 46$\frac{3}{4}$ of *Sugars*, at *s.* 24-6 *per C.* and 1570 *lb.* of *Indigo*, at *s.* 2-4 *per lb.* what remains due to me of my Adventure? Anſwer *l.* 102-12-11$\frac{1}{2}$.

Exported,	343	01	8
Imported,	240	08	8$\frac{1}{2}$
Difference,	102	12	11$\frac{1}{2}$

37. How long will 1000*l.* laſt me, if I ſpend no more or leſs than 3*s.* 6*d.* *per* Day? Anſ. 15 Years, 7 Months, accounting 30 Days to the Month and 29 Days $\frac{12}{42}$, $\frac{2}{7}$.

38. Shipt for the *Straits* 100 Pigs of Lead, *qt.* *C.* 283$\frac{3}{4}$ 12 *lb.* at *l.* 10-17 *per* Fodder, of *C.* 19$\frac{1}{2}$, what come they to? Anſwer *l.* 157-18-9$\frac{1}{2}$$\frac{1869}{2184}$.

To Rate Town-Taxes.

39. Suppoſe *A.* hath an Eſtate of 53*l* a Year, and payeth *s.* 5-10 to the Subſidy, what ſhall *B.* pay whoſe Eſtate is worth 100*l.* *per Annum?* Anſwer 11*s.* $\frac{4}{53}$.

40. Admit a Tax or Rate of 39*l.* is laid on a Town for the Building of a Bridge; and the Value of the *Town-Rent* is 900 *l.* *per Annum*, what is each Man's Proportion to pay, according to his Rent? If one Man in the Town be worth 100*l.* a Year, what ſhall he pay to the ſaid Rate, or 39*l.*? Anſwer *l.* 4-6-8.

Profit

Profit and Loſs.

41. If I buy a Tun of Wine at 9 *l. per* Hogſhead, and ſell it again at 13 *l. per* Hhd. what do I gain *per Cent?*
Anſwer *l.* 44-8-10 $\frac{6}{9}$ or $\frac{2}{3}$.

Company.

42. Two Partners join Stocks for a certain Time, *A.* puts in 250 *l.* *B.* 430 *l.* and in Trade they have gained 340 *l.* what muſt each Man have of the Profit, in Proportion to his Money in Company?

l. 250 A.
430 B.
If *l.* 680 —— *l.* 340 —— *l.* 250 —— Anſw. *l.* 125
If 680 —— 340 —— 430 —————— 215

Proof, 340

Barter.

43. How many Doz. of Candles, at 5*s.* 2*d. per* Doz. muſt I give for C. 3$\frac{1}{2}$ of Tallow, at 37*s.* 6*d. per* C.?
Anſwer 25 Doz. $\frac{19}{62}$.

Whereas a Noble *and a* Mark, *juſt* 15 *Yards did buy,*
How many Ells of the ſame Cloth for 50 *Pounds had I?*
Anſwer 600 Ells.

If 15 *Pounds coſt* 16 *Pence, of Bread that's made of Rye,*
How many Loaves, of ſix Pounds each, for Fourſcore Pounds had I?
Anſwer 3000.

If 5 *Tuns of Logwood coſt* 56 *Pounds,*
How many full Hundreds for 96 *Crowns?*
Anſwer 42 C. 3 *qrs.* 12*lb.*

If 15 *Hundred of our Lead coſt* 16 *Pounds in Gold,*
How much of that Saturnian *Ore for* 40 *Pounds is ſold?*
Anſwer 37 C. $\frac{1}{2}$.

If 30 *Pence, and* 40 *Groats, buy* 50 *Pints of Wine,*
What is the Coſt of 60 *Quarts in current* Engliſh *Coin?*
Anſwer 38 Shillings.

If 9 *Pounds of our* Engliſh *Wool, doth* 90 *Pence require,*
The Value of 1 C. *Weight of you I do deſire.*
Anſwer 4*l.* 13*s.* 4*d.*

If the Half of a Mark *buy the fourth of a Pound,*
How much Cochineal *can I have for a Crown?*
Anſwer 3 Ounces.

If 16 *Shillings and a Crown, for* 13 *Weeks ſupply*
For Meat and Drink, that is my Board; how much a
Day give I? Anſwer 2*d.* $\frac{3}{4}$ *per* Day.

If that a Rule of 3 *Feet long doth give* 5 *Feet in Shade,*
And if a Steeple 99, *how high in Feet is't made?*
Anſwer 59 Feet $\frac{2}{5}$.

To prove the Rule of Three Direct.

Multiply the fourth Number, or Anſwer to the Queſtion, by the firſt; then multiply the ſecond and third Numbers together, and if the Products be alike, the Work is right.

For Trial of which, let us prove the firſt Queſtion in this *Rule*, which was,

If 12 Ells coſt 36*s.* what 456 Ells?

5

And the Anſwer there found, or fourth Number, was 1368 Shillings; which multiplied by the firſt Number, 12, produces 16416, then multiply alſo the ſecond and third Numbers together; to wit, 36, and 456, and the Product is alſo 16416, wherefore the Anſwer is right.

But obſerve well, that when there is any Remainder, after you have divided the Product of the ſecond and third Numbers by the firſt, ſuch Remainder muſt, in the Proof, be added to the Product of the firſt and fourth Numbers, which muſt be equal to the Product of the third Number multiplied by the ſecond.

Or, the Numbers may be more intelligibly proved by varying the Queſtion, thus:

If 456 Ells coſt *l.* 68 : 8, what 12 Ells? *Anſw.* 36*s.*

As in the ſecond *Example* of this Rule.

* * *

CHAP. IX.

The Rule *of* Three *Inverſe.*

I. IN this Rule the 4th Number ſought, bears the ſame Proportion to the firſt, as the ſecond does to the third Number.

II. The Stating of the Queſtion in this Rule differs not from the Method of Stating in the *Direct Rule*; for the Number that aſketh the Queſtion, muſt be the third Number here, as well as there, *&c.* And to know when the Queſtion belongs to this *Rule*, and when to the *Direct*, obſerve this General Rule.

When the Queſtion is ſtated, conſider whether the 4th Number, or Anſwer, ought to be more or leſs than the ſecond Number, (which is eaſily known;) if more, the leaſt of the two Extreams muſt be your Diviſor; but if it ought to be leſs, then the biggeſt of the two Extreams muſt be your Diviſor. [*Here the firſt and third Numbers are called Extreams, with reſpect to the ſecond.*] If the firſt Number is the Diviſor, then the Queſtion belongs to the *Direct Rule*; but if the third is the Diviſor, then the Queſtion pertains to the *Rule of Three Inverſe.*

III. In this Rule you muſt multiply the firſt and ſecond Numbers together, and divide that Product by the third, and the Quotient is the Anſwer, in the ſame Name with the middle Number.

In this Rule, *Note alſo,* That when the third Number is leſs than the firſt, then the Anſwer required will be greater than the ſecond.

Or, when the third Number is greater than the firſt, the Anſwer will be leſs than the ſecond.

Example 1.

If 6 Mowers can mow a common Field in 12 Days, in what time will 24 Mowers do it? Anſw. in 3 Days. *Thus ſtated.*

If 6——— require 12——— what 24?
6 Firſt Number.

Third Number 24)72(3 Days the Anſwer.
72
(0)

Here I conſider the fourth Number, or Number ſought, requires leſs than the ſecond; for the more the Hands, the leſſer the time, and therefore the greater of the two Extreams muſt be the Diviſor, which is the third Number; therefore the Queſtion is to be anſwer'd by the *Rule Inverſe*. Wherefore, according to *Rule* the 3d, I multiply the firſt and ſecond Numbers together and divide by the third, and the Quotient is the Anſwer, *viz.* 3 Days; as in the preceding Work.

Here, as the third Number contains the ſecond twice, ſo doth the firſt contain the fourth, according to the firſt *Rule* of this Chapter.

Example 2.

If when Wheat is 4*s*. the Buſhel, the 20 Penny-Loaf weighs 18 *lb*. what muſt the ſaid 20 Penny-Loaf weigh when Wheat is 6*s*. the Buſhel? Anſwer 12 *lb*.

If 4 give 18, what 6?
4

6)72(12 *lb*. Anſwer.

Here alſo the fourth Number requires leſs; for the dearer the Wheat the leſſer or lighter the Loaf: So therefore, the greater of the two Extreams, *viz.* 6, is the Diviſor, which being the third Number, denominates the Queſtion to be *Inverſe*.

Example 3.

Admit I lend a Friend on his Occaſion, 100*l* for ſix Months, and he promiſes me the like Kindneſs when I deſire it; but when I came to requeſt it, he could lend me but 75 *l*. the Queſtion is, how long I may keep his Money to recompence my Courteſy to him?
Anſwer 8 Months.

If 100 give 6, what 75?
6

75)600(8 Months, Anſwer.
600

(0)

Here it is apparent, the leſſer the Sum, the more the Time, and therefore the leſſer Extream is the Diviſor which is 75.

Example 4.

How many Dollars at 4*s.* 4*d.* muſt be given for 360 Guilders, at 2*s.* 2*d.* Anſwer 180.

```
   s. d.                    s. d.
If 2-2  give  360, what   4-4 ?
   12          26          12
   ——         ————         ——
   26         2160         52
               720
              ————
           52)9360(180 Dollars.
              52··
              ———
              416
              416
              ———
              (0)
```

Here the more the Value, the fewer the Pieces, and therefore the bigger of the Extreams is the Diviſor, which is the 3d Number, and therefore it is *Inverſe.*

Example 5.

If 100*l.* Principal gain 5*l.* Intereſt in 12 Months, what Principal will gain as much in 5 Months? Anſwer 240*l.*

```
M.    l.    M.
12————100————5
       12
    ———————
     5)1200
    ———————
     l. 240 Principal. Anſwer.
    ———————
```

If 45 Acres be mowed by 6 Men, how much ſooner will they be mowed by 10?

The ſix Men in three Days ſuppos'd are to do it,
The Time muſt be leſs, 'cauſe more are put to it.

Anſwer 1 Day $\frac{8}{10}$

Example

Example 6.

When an Acre of Land doth contain 4 Poles in Breadth then muſt it *qt.* 40 in Length; what muſt be the Length, when there are 13 Poles in Breadth? Anſw. 12 P. $\frac{4}{13}$, or 5 Foot $\frac{1}{13}$. *See the Work.*

P.B. *P.L.* *P.B.*
If 4 give 40, what 13?
4
———
13)160(12
13
———
30
26
———
4
16½
———
64
2 the ½ of 4.
———
13)66(5 Foot $\frac{1}{13}$.
65
———
(1)

Here the Breadth is more, and therefore the Length muſt be leſs.

Example 7. A Room 30 Foot long, and 18 Foot wide, is to be covered with painted Cloth, how many Yards of *Holland Duck*, of $\frac{3}{4}$ wide, will cover it?
Anſwer 240 Foot, or 80 Yards.

Ex. 8. If a Man performs a Journey in 6 Days, when the Day is 8 Hours long, in what Time will he do it when the Day is 12 Hours long? *Anſw.* 4 Days.

Ex. 9. If 150 Pioneers caſt a Trench in 24 Hours, how many muſt be ſet on to perform it in 6 Hours?

Anſw. 600 Pioneers.

Ex. 10. If a Piece of Graſs will graze 56 Oxen 6 Days, how many muſt be turned out, that it may laſt the remaining Oxen 16 Days?

Anſw. 35 Oxen out, 21 ſtay.

Ex. 11. How much Shalloon of 3 *qrs.* wide will ſerve to line 9 Yards of Cloth of 7 *qrs.* wide?

Anſw. 21 Yards.

Ex. 12. If 10 Pounds worth of Wine, at 18*d.* the Bottle, accommodate 30 Men, how many will the ſaid 10 Pounds entertain with Wine, at 3*s.* 6*d.* the Bottle?

Anſw. $12\frac{36}{42}$ Perſons.

Ex. 13. If for 5*l.* 5*s.* I have 14 *C.* Wt. carried 136 Miles, how many Miles may I have 24 *C.* carried for the ſame Money? Anſw. $79\frac{1}{3}$ Miles.

Ex. 14. In 730 *German* Rixdollars, at 4*s.* 5*d.* $\frac{3}{4}$, how many *Venetian* Ducats at 4*s.* 4*d.* Anſw. $754\frac{118}{208}$.

Ex. 15. How many Pounds of Coffee, at 5*s.* 9*d* *per lb.* is equal in Value to 426 Pound of Tea, at 13*s.* 4*d.* *per lb.* Anſw. $987\frac{57}{69}$.

Ex. 16. If 60 Ells *Engliſh* be equal to 100 Ells *Flemiſh*, and each Ell *Engliſh* contains 20 Nails of a Yard, how many ſuch Nails doth the *Flemiſh* Ell contain?

Anſw. 12 Nails.

Ex. 17. *If* 14 *Men, in* 15 *Days, build* 16 *Rod of Wall,*
How many Men muſt added be to do't in 2, *that's all?*

Anſw. 105 Men.

CHAP. X.

The Double Rule *of* Three *Direct.*

I. QUESTIONS in this Rule have five given Numbers, to find a ſixth in Proportion.

II. Any Queſtion in the *Double Rule of Three* may be anſwered by two *Single Rules of Three*; that is, at two Statings, *&c.* or by one Rule compoſed of the five given Numbers.

III. Three of the five given Numbers imply a Suppoſition, and the other two a Demand.

Example 1.

If 100 *l.* in 12 Months gain 6 *l.* Intereſt, what will 25 *l.* gain in 4 Months?

Here the Suppoſition lies on the firſt Numbers, *viz.* 100, 12, and 6; for it is ſaid, if (or ſuppoſe) 100 *l.* in 12 Months, gain 6 *l.* Intereſt; and the Demand lies on the two laſt Numbers, *viz.* 25 and 4; for it is demanded what will 25 *l.* gain in 4 Months?

IV. In your firſt ſtating, you muſt obſerve always to make that the ſecond Number, which is of the ſame Denomination with the Number required; and one of the other Numbers in the Suppoſition (it matters not which) muſt be the firſt Number; and that Number in the Demand of the ſame Name with the firſt, muſt be the third Number; and then your firſt ſtating will ſtand thus:

l. Prin. *l.* Int. *l.* Principal.
If 100—gain—6——what 25?

Here the 2d Number is of the ſame Name with the Number required; for the Intereſt of 25 *l.* is required; and the ſecond Number is Pounds Intereſt; and the firſt Number is Pounds Principal; and ſo is the third Number 25, being one of the Numbers in the Demand. And being ſo ſtated, I work as in the *Single Rule of Three*, thus;

If

l. P. *l.* I. *l.* P.
If 100——gain 6,——what 25?
6

l. 1|50
20

10|00 Anſw. 1*l.* 10*s.*

Here I cut off two Figures towards the Right-hand, which is divided by 100, according to the Directions given in *Diviſion*.

And having now found the Intereſt of 25*l.* by this firſt Operation, I proceed to the ſecond: And note always, *That the Anſwer to the firſt Stating is the middle Number to the ſecond*; as thus:

Mo. *s.* *Mo.*
If 12——give——30,——what 4?
4

12)120

10*s.* Anſwer.

Here in the ſecond Stating, the remaining Number in the Suppoſition is the firſt; and the other of the ſame Name in the Demand, is the third Number, and the middle Number is of the ſame Name we ſeek for, *viz.* Intereſt; and is the Anſwer to the Queſtion, *viz.* 10*s.*

And thus, by theſe two Operations in the *Rule of Three*, I find the Anſwer to the Queſtion, *viz.* That if 100*l.* Principal in 12 Months gain 6*l.* Intereſt, the 25*l.* Principal will gain 10 Shillings Intereſt in 4 Months.

The ſame Anſwer will alſo be found, if you work after the following Manner:

If 12 gain 6, what 4?
4

12)24

2 *l.* Anſwer.

If 100 *l.* gain 2 *l.* what—25 *l.*
20 *s.* 40 2d. Number.

40 10|00 Anſw. 10 *s.*

1|00

The middle Number in the laſt Stating is brought into Shillings, otherwiſe I could not have divided by the firſt Number.

V. The laſt Queſtion, or any other in this Rule, may be alſo anſwered by a Rule compoſed of the five given Numbers (as was ſaid in the IId. Rule of this Chapter) after this Manner: State the Queſtion ſo, that the Numbers may ſtand in one continued Rank, and in ſuch Order, that the firſt and fourth Numbers may be of one Denomination, and the ſecond and fifth.

Then multiply the two firſt Numbers together, for a Diviſor; and the three laſt together for a Dividend, and the Quotient will be the Anſwer, in the ſame Name with the middle or third Number, for the Trial of which, let us take the laſt *Example*, viz.

(1) (2) (3) (4) (5)
l P. *M.* *l. I.* *l. P.* *M.*
If 100 in 12, gain 6, what 25 in 4?
12 20

1200 120
25 4th Number.

600
240

3000
4 5th Number.

Diviſor 12|00) 120|00
10 Shillings, Anſwer.

Here the Queſtion is ſtated, and worked as before directed; and the Anſwer is 10*s.* as it was when wrought at two Operations.

If the foregoing Directions are heedfully attended to, they are ſufficient for any one's Inſtruction in the *Double Rule of Three Direct*; and alſo for the working of any Queſtion therein, by the Rule compoſed of five Numbers, and therefore I ſhall only add ſome Queſtions, with their Anſwers, and ſo proceed to the next Rule.

Example 2. If 750 Buſhels of Oats ſerve 500 Horſes 6 Days, how many Buſhels will ſerve 1000 Horſes 14 Days? Anſw. 3500 Buſhels.

Ex. 3. If 36 Acres of Graſs be mowed by 6 Men in 8 Days, how many Acres will be mowed by 36 Men in 38 Days? Anſw. 1026 Acres.

Ex. 4. If 1000*lb.* of Beef or Pork, ſerve 250 Seamen 7 Days, how many Pounds of ditto will ſerve 550 Seamen 63 Days, or 9 Weeks? Anſw. 19800*lb.*

Ex. 5. If a Carrier receives 30*s.* for the Carriage of 3 *C.* Weight 150 Miles, what muſt he receive for the Carriage of 7 *C.* Weight 50 Miles? Anſw. 23*s.* 4*d.*

Ex. 6. If 100 *l.* in 12 Months gain 5 *l.* Intereſt, what will 63 *l.* gain in 6 Months at that Rate?

Anſwer *l.* 1–11–6.

Ex. 7. If 6 Quarters of Malt are ſufficient for a Family of 12 Perſons, for 3 Months, how many Quarters will ſerve a Family of 24 Perſons 12 Months?

Anſwer 48 Quarters.

Ex. 8. If a Perſon takes in 320 *l.* to pay Intereſt for the ſame, and at the End of 12 Months pays for Principal and Intereſt *l.* 339–4; the Queſtion is, at what Rate *per Cent. per Annum* did he pay Intereſt?

Anſwer 6 *per Cent. per Annum.*

Ex. 9. If 15 *s.* pay 5 Men for 6 Days, how much will pay 20 Men for 10 Days? Anſwer 5 *l.*

Ex. 10. If 36 Buſhels of Wheat in one Year yield 216 Buſhels, how much will 36 Quarters yield in 6 Years?

Anſwer 10368 Buſhels.

CHAP. XI.

The Double Rule *of* Three *Inverſe.*

QUESTIONS in this Rule are wrought by two ſingle *Rules of Three*, as thoſe in the foregoing Rule; but you are to obſerve, that one of the Statings (and never but one) will fall out to be *Inverſe*, and muſt be worked accordingly.

Any Queſtion in this Rule alſo may be anſwered by the Compound Rule of five Numbers; obſerving to make the ſecond and fourth Numbers of the like Name, and the third and fifth; then multiply the third and fourth Numbers together for a Diviſor, and the other three remaining Numbers together for a Dividend, and the Quotient will be the Anſwer in the ſame Name with the firſt Number.

Example 1.

If 50 Pioneers in 6 Days caſt a Trench 30 Yards long, how many Pioneers will caſt a Trench 200 Yards long in 3 Days? Anſw. $666\frac{2}{3}$ Pioneers.

D. *Pion.* *D.* *Yds.* *Pion.* *Yds.*
If 6 require 50, what 3? If 30 require 100, what 200?
6 100
3|300 3|0)200|0
100 $666\frac{2}{3}$

If 30 require 50, what 220? If 6 require $333\frac{1}{3}$, what 3?
50 6
3|0)1000|0 3)2000
Anſw. $333\frac{1}{3}$ $666\frac{2}{3}$

Here the Queſtion is anſwered by two ſingle *Rules of Three*, two different Ways, as in the foregoing Work may be ſeen; and the firſt ſtating in the firſt Way falls out to be *Inverſe*, but the laſt in the ſecond Way does the ſame; for both Statings are never *Inverſe*, as was ſaid before.

Or it may be done by the Compound Rule of five Numbers, thus:

(1) (2) (3) (4) (5)
P. *D.* *Yds.* *D.* *Yds.*
If 50——6——30——3——200
3 6 Second.
90 1200
50 First.
9|0)6000|0
Anſ. $666\frac{60}{90}$, or $\frac{2}{3}$.

Example 2. If 100 *l.* Principal in 12 Months gain 6 *l.* Intereſt, what Principal will gain 18 *l.* in 15 Months? Anſw. 240 *l.*

Example 3. If a Perſon travels 320 Miles in 10 Days, when the Day is 12 Hours long, in how many Days may he travel 640 Miles, when the Day is 16 Hours long? Anſw. 15 Days.

Example 4. If 36 *l.* ſerve for the Board of 12 Perſons 6 Weeks, how long, or how many Weeks will 260 *l.* ſerve for the Board of 36 Perſons?
Anſw. $14\frac{4}{9}$ Weeks.

CHAP. XII.

RULES *of* PRACTICE.

THESE Rules are moſt compendiouſly contrived for the ſpeedy caſting up of any Sort of Goods, or Merchandize; and therefore are of excellent Uſe among *Merchants*, *Tradeſmen*, *&c.* for their quick and elegant Diſpatch of Buſineſs; and, from their frequent Uſe, are called Rules of *Practice*.

Any Queſtion in the *Rule of Three*, that hath an Unit, or 1 for its Number, may be much ſooner done by theſe brief Rules, than the Method followed in that, as too much abounding in Figures.

In order for working, the following Tables are to be well underſtood, and perfectly got by Heart.

The

The Even Parts of MONEY.

Parts of a Shill. *d.*	is	*Of a Pound.* or	*Parts of a Pound.* *s. d.*	is
6	$\frac{1}{2}$	$\frac{1}{40}$	10 0	$\frac{1}{2}$
4	$\frac{1}{3}$	$\frac{1}{60}$	6 8	$\frac{1}{3}$
3	$\frac{1}{4}$	$\frac{1}{80}$	5 0	$\frac{1}{4}$
2	$\frac{1}{6}$	$\frac{1}{120}$	4 0	$\frac{1}{5}$
1½	$\frac{1}{8}$	$\frac{1}{160}$	3 4	$\frac{1}{6}$
1	$\frac{1}{12}$	$\frac{1}{240}$	2 6	$\frac{1}{8}$
3 Farthings		$\frac{1}{320}$	2 0	$\frac{1}{10}$
1 Halfpenny		$\frac{1}{480}$	1 8	$\frac{1}{12}$
1 Farthing		$\frac{1}{960}$	1 0	$\frac{1}{20}$

The Even Parts of WEIGHT.

Pts. of a Tun. C.	is,	*Pts. of C. Weight.*	is,	*Pts. of* ½ C. *and* ¼ C.	is,	
10	$\frac{1}{2}$	2 *qrs.*	$\frac{1}{2}$	28	$\frac{1}{2}$	½ C.
5	$\frac{1}{4}$	1 *qr.*	$\frac{1}{4}$	14	$\frac{1}{4}$	
4	$\frac{1}{5}$	0 16 *lb.*	$\frac{1}{7}$	8	$\frac{1}{7}$	
2½	$\frac{1}{8}$	0 14	$\frac{1}{8}$	7	$\frac{1}{8}$	
2	$\frac{1}{10}$	0 8	$\frac{1}{14}$	14	$\frac{1}{2}$	¼ C.
1¼	$\frac{1}{16}$	0 7	$\frac{1}{16}$	7	$\frac{1}{4}$	
1	$\frac{1}{20}$			4	$\frac{1}{7}$	

I. When the Price of the Integer is a Farthing, take the 4th Part of the given Number (or divide it by 4) and the Quotient is Pence, and if any thing remain, it is Farthings; then thoſe Pence divide by 12 and by 20; or you may take the 6th Part of the given Number, and the Quotient will be 3 Halfpences, and them divide by 8 and by 20. Or elſe you may take the 12th Part, and the Quotient will be Threepences. *Examples* of theſe ſeveral Ways follow, *viz.*

4)987654

4)987654 *lb.* of Caſt Iron, at $\frac{1}{4}$ *per lb.*

12)246913—$\frac{1}{2}$ Rem. becauſe the Dividend was Far-[things.

2|0)2057|6—1 *d.*

l. 1028–16–1$\frac{1}{2}$, Anſwer.

Again.

6)987654

$\frac{1}{8}$)164609 Three Halfpences.

2|0)2057|6—1*d.* $\frac{1}{3}$ Becauſe the Dividend was Three-[Halfpence.

l. 1028–16–1$\frac{1}{2}$ Anſwer.

Once more.

12)987654

Three-pences. $\frac{1}{4}$)82304—1$\frac{1}{2}$

2|0)2057|6

Anſ. *l.* 1028–16–1$\frac{1}{2}$

I have often obſerved, that Learners are many times in doubt concerning the ſeveral Remainders what to call, or account them; wherefore let them note once for all, That at any time, whatever remains, it is always of the ſame Name with that you account the Dividend; that is, if the Dividend is accounted Farthings, or Pence, or Shillings, *&c.* ſo is the Remainder to be reckoned. Or to repreſent it more intelligibly, the Remainder is always ſuch a Part of a Shilling (if you take Parts of a Shilling) as you take for, whether a $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{6}$, $\frac{1}{8}$, or $\frac{1}{12}$; that is, the Remainders are either Sixpences, Groats, Threepences, &c. according to the Part you take. And ſo likewiſe for the even Parts of a Pound, you may be governed by the ſame Rules.

II. When the Price given is $\frac{1}{2}$*d.* then take the 12th Part of the given Number, and the Quotient will be Sixpences; of which take the Half, and they are Shillings, which divide by 20, by halving them, &c. to bring them into Pounds.

12) 5670 *lb.* Copperas, at $\frac{1}{2}$ *per lb.*
d. $\frac{1}{2}$|472—3*d*
2|0)23|6
l. 11–16–3 Anſwer.

lb. *Or thus:*
$\frac{1}{2}$)5670 Sea Bread, at $\frac{1}{2}$*d.*
1 *d.* $\frac{1}{12}$|2835
2|0)23|6—3*d.*
l. 11–16–3 Anſwer.

In the ſecond Work I take the $\frac{1}{2}$ of the Half-pence, and they make Pence, of which I take the $\frac{1}{12}$ a Penny being the $\frac{1}{12}$ of a Shilling, &c.

III. When the Price is 3 Farthings, take the $\frac{1}{2}$ of the given Number of Integers, and that Half is 3 Half pennies, or the 8th Part, and they are Six-pences; which either divide by 8, and by 20, or by $\frac{1}{2}$ and by 20, &c.

$\frac{1}{2}$ 4720 Ells of Canvas, at $\frac{3}{4}$.
$\frac{1}{8}$ 2360
2|0)29|5
l. 14–15 Anſw.

Or thus:
$\frac{1}{8}$ 4720 Ells, at $\frac{3}{4}$.
$\frac{1}{2}$ 590
29|5
l. 14–15 Anſw.

IV. When the given Price is Pence, and an even Part of a Shilling, conſider what Part it is, and divide the given Quantity by it, and the Quotient is Shillings; and thoſe Shillings by 20, &c.

1*d*	$\frac{1}{12}$	549 *lb.* Iron, at 1 *d.*	3*d*	$\frac{1}{4}$	7654 *lb.* Soap, at 3*d.*
		45-9*d.*			191-3-6
		l. 2-5-9 Anſwer.			*l.* 95-13-6 Anſwer.
d. 1$\frac{1}{2}$	$\frac{1}{8}$	369 *lb.* at 1*d* $\frac{1}{2}$.	4*d*	$\frac{1}{3}$	2486 *lb.* at 4*d.*
		4-6-1$\frac{1}{2}$			[illegible]-8-8
		l. 2-6-1$\frac{1}{2}$ Anſwer.			*l.* 41-8-8 Anſwer.
2*d*	$\frac{1}{6}$	396 Yds. Ribbon, at 2*d*	6*d.*	$\frac{1}{2}$	5769 at 6*d.*
		6-6			2886-4-6
		l. 3-6 Anſwer.			*l.* 144-4-6 Anſwer.

Sums in *Practice* admit of various Ways of working, and equally ſhort, each producing the ſame Anſwer, and ſerve as a Proof of each other; and 'tis very proper, and moſt conciſe, to prove *Practice* by *Practice*. It likewiſe may be proved by the *Rule of Three*; or by reducing the Anſwer into the ſame Name with the Price, and divide it by the Price, and the Quotient will be the given Quantity; or if you divide by the Quantity, the Quotient will be the Price.

V. When the Price of the Integer is Pence, and no even Part of a Shilling, it may be divided into even Parts; as 7 Pence is compoſed of the Parts $\frac{1}{4}$ and $\frac{1}{3}$, *viz.* 3*d.* and 4*d.* Wherefore, firſt take $\frac{1}{4}$ of the given Number, and then the $\frac{1}{3}$ alſo, and add both Lines together. Likewiſe 9*d.* is compoſed of the Parts $\frac{1}{2}$ and $\frac{1}{4}$, or 6*d.* and 3*d.* and 5*d.* of 3*d.* and 2*d*, &c. Sometimes it is more conciſe to take Part of Parts: Suppoſe 9*d.* were the Price, I firſt take ½ for 6, and then the ½ of that ½ for the 3*d.* becauſe 3*d.* is the ½ of 6; and then I add the two Lines together. Or, if the Price were 5 Farthings, I take the $\frac{1}{12}$ for the Penny, and then the ¼ of that Line for the Farthing, becauſe a Farthing is ¼ of a Penny.

Examples.

		342*lb.* Candles, at 5*d.*
	¼	85-6
	⅙	57-0
		14-2-6
		l. 7-2-6 Anſwer.
		679 Yds. Paving, at 7*d.*
3*d*	¼	169-9
4*d*	⅓	226-4
		39-6-1
		19-16-1 Anſwer.
	l.	3790 Yds. Linen, at (10*d.*
6*d*	½	1895
4*d*	⅓	1263-4
		315|8-4
	l.	157-18-4 Anſwer.

		429 *lb.* Loaf-Sugar, (9*d.*
6*d*	½	214-6
3½	6*d*	107-3
		321-9
	l.	16-1-9 Anſwer.
		Or thus:
		429 *lb.* at 9*d.*
6*d*	½	214-6
3*d*	¼	107-3
		32|1-9
	l.	16-1-9 Anſwer.

Or thus:

Yds. 37900

12)315—8-4

l. 157-18-4

☞ In the laſt Work I put a Cypher to the given Number, which is multiplying by 10, and the Product is Pence; which I divide by 12 and by 20.

		1349 *lb.* Tobacco, at 11*d.*
6*d*	$\frac{1}{2}$	674—6*d.*
4	$\frac{1}{3}$	449—8
1	$\frac{1}{4}$	112—5
of 4*d.*		
		123|6—7
		l. 61-16—7 Anſwer.

Or thus:

1349*lb.* 11*d.*
10

13490
Odd Penny. 1349

12)14839

123|6—7

l. 61-16—7 Anſ.

		4796 Quarts of Beer, at 5 *qrs.*
1*d*	$\frac{1}{12}$	399—8
$\frac{1}{4}$	$\frac{1}{4}$	99—11
of a Penny.		
		49|9—7

Anſw. *l.* 24-19-7

VI. When the Price is Pence and Farthings, then work for the Pence as before; and for the Farthings, obſerve what Part they make, of the Parts taken before, which take out of any one of the Lines, of which the Farthing or Farthings make an even Part, and add all together.

		856Yds Ribbon, (at 4*d.*$\frac{1}{2}$
4	$\frac{1}{3}$	285—4
$\frac{1}{2}$ of 4*d.*	$\frac{1}{8}$	35—8
		32|1—0
		l. 16-1-0

		987 Yds. Painting [at 10*d.*$\frac{3}{4}$.
6*d*	$\frac{1}{2}$	493—6
4	$\frac{1}{3}$	329
$\frac{1}{2}$ of 4*d.*	$\frac{1}{8}$	41—1$\frac{1}{2}$
$\frac{1}{4}$	$\frac{1}{2}$	20—6$\frac{3}{4}$
		88|4--2$\frac{1}{4}$
		l. 44 : 4 : 2$\frac{1}{4}$ Anſw.

Here I firſt take the ⅓ Part of the given Number for the Groat; then for the Half-pence, I conſider it is the 8th Part of 4*d.* wherefore I take the 8th Part of that Line, *viz* 285 *s.* 4*d.* ſaying the 8's in 28, *&c.*

		479 *lb.* Pepper, at (9*d.* ¾.
6*d*	½	239—6
3½	of 6	119—9
¾	¼	29—11¼
of	3*d*	
		38|9—2¼
		l. 19—9—2¼ Anſw.

		679 *lb.* of Cotton, at (7*d.* ½.
6	½	339—6
1½	¼	84—10½
of 6*d*		
		42|4—4½
		l. 21 : 4 : 4½ Anſw.

VII. When the Price is any Number of Pence above a Shilling, and not two Shillings, let the given Quantity ſtand as Shillings, and take even Parts for the Pence, and ſet the Quotient underneath in proper Order, without drawing a Line, and add it to the given Number, and the Total will be the Anſwer in Shillings.

Examples.

		469 Yds. Stuff, at 13*d*
1*d*	1/12	39—1*d.*
		50|8—1
		l. 25 : 8 : 1

		742 Yds at 19*d.*
6*d*	½	371
1*d*	⅙	61—10
of 6*d.*		
		117|4—10
		l. 58 : 14 : 10 Anſ.

Here 469 ſtands as Shillings, of which I take the 12th Part for the Penny, and add both together: In the next *Example,* 742 ſtand as Shillings, of which I take the ½ for the 6*d.* and the 6th Part of 371, *&c.*

		2460 *lb*. Tobacco, at 16*d*.
4*d*	$\frac{1}{3}$	820
		328|0
		l. 164 Anſwer.

Or thus:

3)2460

5)820

l. 164

		320 Ells Holland, at (20 *l*. ½.
4*d*	$\frac{1}{3}$	140
4*d*	$\frac{1}{3}$	140
½ of 4*d*.	$\frac{1}{8}$	17—6
		71|7—6
		Anſ. *l*. 35 : 17 : 6

		794 Buſh. of Oats, at (22*d* ½.
6*d*	$\frac{1}{2}$	397
4*d*	$\frac{1}{3}$	264—8
½	$\frac{1}{8}$	33—1
		148|8–9
		l. 74 : 8 : 9 Anſwer.

Note, That in the ſecond Work of the firſt *Example* above, I divide by 15, according to the 9th Rule of the 5th Chapter; becauſe 16*d*. is the 15th Part of a Pound, as 15 is the 16th Part. Or when the Price is 14, 16, 18, 21, or 22*d*. under 2*s*. if you bring the ſaid Prices into 2*d*. 3*d*. 4*d*. 6*d*. or 8 Pences, you may bring them into Pounds, &c. at one Operation, by taking Parts according to the 2d Table of *Practice*, at the Beginning of the Rules of *Practice*.

Examples.

7890 Yds. at 14*d*.
7

2*d*. $\frac{1}{120}$ | 5523,0 *Two-pences.*

Anſw. *l*. 460—3

988 *lb*. at 15 *d*.
5

3*d*. $\frac{1}{80}$ 494,0 *Three-pences.*

Anſw. 61 : 15

6709 *lb.* at 21*d.*
7

3*d.* $\frac{1}{80}$|4696,3 *Three-pences*

l. 587 : 0 : 9 Anſwer.

3796 at 22*d.*
11

[2*d.* $\frac{1}{120}$|4175,6

l. 347 : 19 : 4 Anſwer.

VIII. When the Price given is ſuch a Number of Shillings, or Shillings and Pence, as make an even Part of a Pound, divide the given Quantity by that Part, and the Quotient will be Pounds.

1*s.* 8*d.*|$\frac{1}{12}$|374 Guild. at 20*d.*

Anſw. 31 : 3 : 4

746 Gal. Spirits, at 2*s.*

2*s.* |$\frac{1}{10}$|*l.* 74 : 12 Anſwer.

In the firſt of theſe *Examples* I divide the given Quantity by 12, becauſe 20*d.* is the $\frac{1}{12}$ of a Pound, and there remains 2, which is two 1*s.* 8*d.*'s, or 3*s.* 4*d.* So the Anſwer is *l.* 31 : 3 : 4.

IX. When at any time the Price is 2*s.* as in the ſecond *Example* above, the Anſwer may be known at Sight; for 'tis but doubling the laſt Figure towards the Right hand, and note it for Shillings; and the other Figures towards the Left-hand are Pounds, as above, the double of 6 is 12*s.* and the two other Figures are Pounds, *viz.* 74*l.* in all 74 : 12.

From this Notion of underſtanding the Value of any Quantity, at 2*s.* at Sight, many Things may be expeditiouſly anſwered, *viz.*

Examples.

Examples.

756 Gal. at 3*s*. 6*d*. *per* Gal.

75—12 at 2*s*.
½ 37—16 at 1*s*.
½ 18—18 at 6*d*.

l. 132—06 Anſw.

3*s*. 4*d*.|⅙|576 *lb*. Indigo, at (3*s*. 4*d*.
l. 96 Anſw.

5*s*.|¼|296 Yds. Silk, at 5*s*.
l. 74 Anſw.

2*s*. 6*d*.|⅛|973 Florins, at 2*s*. (6*d*.
l. 121-12-6 Anſw.

Here 5 *Half-Crowns remain or* 12*s*. 6*d*.

492 Yds. at 9*s* 4*d*.

49—4 at 2*s*.
4 times 2 is 8*s*.

196—16 at 8*s*.
24—12 at 1*s*.
4*d*. ⅓ 8—04 at 4*d*.

l. 229—12 Anſwer.

4*s*.|⅕|749 *pcs*. ⅜ at 4*s*.
l. 149—16 Anſwer.

6*s*. 8*d*.|⅓|988 Gal. Brandy, (at 6*s*. 8*d*.
l. 329—6—8 Anſ.

10*s*.|½|575 Yds. Br. Cloth, (at 10*s*.
l. 287—10 Anſwer.

X. When the Price is Shillings and Pence, or Shillings, Pence, and Farthings, and no even Part of a Pound, then multiply the given Quantity by the Shillings in the Price, and take Parts for the reſt, and add all together.

Examples.

756 *lb.* Coffee, at 5*s.* 8*d.*
5
d | 3780
4 | $\frac{1}{3}$ | 252
4 | $\frac{1}{3}$ | 252
428|4
l. 214–4 Anſwer.

570 Qrs. of Wheat, at (32*s.* 6*d.*
32
1140
d | 1710
6 | $\frac{1}{2}$ | 285
1852|5
l. 926–5 Anſwer.

436 *lb.* Cinnamon, at (9*s.* 7*d.*
9
d | 3924
6 | $\frac{1}{2}$ | 218
1 | $\frac{1}{6}$ | 36–4
417|8–4
l. 208–18–4

746 *C.* Cheeſe, at (27*s.* 4*d.*
27
5222
d | 1492
4 | $\frac{1}{3}$ | 248–8
2039|0–8
l. 1019–10–8 Anſwer.

XI. When the Price is Shillings and Pence, and no even Part of a Pound, yet many times it may be divided into even Parts; as 7*s.* 6*d.* is compoſed of 5*s.* and 2*s.* 6*d.* and 11*s.* 8*d.* of 10*s.* and 1*s.* 8*d.* 12*s.* 6*d.* of 10*s.* and 2*s.* 6*d.* 15*s.* of 10*s.* and 5*s.* &c.

205 Gall. Tent, at 7*s.* 6*d.*
5*s.* | $\frac{1}{4}$ | 51–5
2*s.* 6*d.* | $\frac{1}{8}$ | 25–12–6
l. 76–17–6

Or thus:
205
2*s.* 6*d.* $\frac{1}{8}$ 25–12–6
[3½ Cr. is 7*s.* 6*d.* 3
l. 76–17–6

190 Bar. Argal. at (11*s*. 8*d*.

s. *d*.		
10	$\frac{1}{2}$	95
1-8	$\frac{1}{12}$	15-16-8

l. 110-16-8

172 *C*. Iron, at (12*s*. 6*d*.

s. *d*.		
10	$\frac{1}{2}$	86
2-6	$\frac{1}{8}$	21-10

l. 107-10 Anſwer.

XII. When at any time the Price is an even Number of Shillings, multiply the Quantity by half of the Price, and double the firſt Figure of the Product, and ſet it apart for Shillings; and the other Figures to the Left-hand will be Pounds.

Examples.

79 Buſhels Wheat, at 6*s*.
3 — the half 3
l. 23-14 Anſwer.

764 *C*. *Suff*. Cheeſe, at 12*s*.
6 — the half 6
l. 458-8 Anſwer.

326 *lb*. Mace, at 22*s*.
11 — 11
l. 358-12 Anſwer.

90 *lb*. Saſſafras, at 8*s*.
4 — 4
l. 36-00 Anſwer.

85 Yards of Cloth, at 14*s*.
7 — 7
l. 59-10 Anſwer.

623 *C*. Ginger, at 24*s*.
12 — 12
l. 747-12 Anſwer.

When the Multiplier conſiſts of two Places (when the Price is an even Number of Shillings) ~~and that it cannot well be work'd to have the Product in one Line~~; after you have done with the Unit Figure, and come to multiply by the ſecond, obſerve to ſet the firſt Figure of the Product juſt under the ſecond of the firſt Line; for that doubled and ſet apart for Shillings, takes up the firſt Place.

756 *C.* of Currants, at 48*s.*	219 *C.* at 56*s.*
24	28
302-8	175-4
1512	438
l. 1814-8 Facit.	*l.* 613-4 Anſwer.

When the Price is an even Number of Shillings, if it be required to know what Quantity of any thing may be bought for ſo much Money~~, it may be known by this ſhort Rule, viz.~~ annex a Cypher to the Money, and divide by half of the propoſed Price.

Examples.

How many Pounds of Indigo may be bought for 54 *l.* at 4*s.* *per* lb.

2)540

Anſw. 270 *lb.*

What Quantity of Cloth at 12*s.* *per* Yard may be bought for 236*l.*

6)2360

Yards 393$\frac{2}{6}$, or, $\frac{1}{3}$ Anſw.

How many Gallons of Canary at 6*s.* *per* Gallon, may be bought for 250*l.*

3)2500

833$\frac{1}{3}$ Anſwer.

XIII. When the Price is an odd Number of Shillings, work for the even Part, as in the laſt Rule, and for the odd Shillings take the $\frac{1}{20}$ of the given Number, and add them together, as in the following Examples.

96 Piſtoles at 17*s.*
8   8–1
s. 76–16
1 | $\frac{1}{20}$ | 4–16
l. 81–12 Anſwer.

260*lb.* China Silk at 21*s.*
10   10–1
s. 260–00
1 | $\frac{1}{20}$ | 13–00
l. 273–00 Anſwer.

XIV. When the Price of the Integer is Pounds, Shillings, and Pence, reduce the Pounds and Shillings into Shillings, and multiply the given Number of Integers by the ſaid Shillings; and then take Parts for the Pence, as before. Or, if the Shillings and Pence make an even Part or even Parts of a Pound, then multiply the Quantity by the Pounds, and take even Parts of a Pound for the Remainder of the Price, and add the Reſults together. Or, when the Price is Shillings, above 20, and under 60, you may let the Integers ſtand as Pounds, and (without drawing a Line) take Parts for the odd Money, and add all together.

Examples.

C.   *l. s. d.*
426 Turmeric, at 3–12–6
72   20
852   72
d 2982
6 | $\frac{1}{2}$ | 213
3088|5
l. 1544–5 Anſw.

Or thus:
C.   *l. s. d.*
426 at 3–12–5
3
s.   1278
10 | $\frac{1}{2}$ | 213
2–6*d.* | $\frac{1}{8}$ | 53–5
l. 1544–5 Anſw.

```
       C.                  l. s. d.
      316Saltpetreat4·15-6
       95                   20
     ------               ------
      1580                  95
c| |2844                  ------
6|½|  158
   ----------
   3017|8
   ----------
 l.1508-18
   ----------
```

Or thus:

```
                C.     l. s. d.
               316 at 4-15-6
                 4
              -------
              1264
10s. | ½ |     158
 5   | ½ |      79
6d.  |1/10|      7—18 Anſw.
              ---------
          l. 1508—18 Anſw.
              ---------
```

XV. If the Quantity given hath any odd Weight or Meaſure annexed to it, as $\frac{1}{4}$, a $\frac{1}{2}$, or $\frac{3}{4}$ (after you have work'd as before, for the whole Number) then take $\frac{1}{4}$, a $\frac{1}{2}$, or $\frac{3}{4}$ of the Price, and add it to the other Work.

Examples.

```
        lb.
       256½ LegeeSilk, at
        15          (15s. 7d.
     --------       --------
       1280         ½|7—2½
d|   | 256
6| ½ |  128
1|1/12|   21—4
for ½ lb.  7—9½
     -----------
     ½|399|7-1½
     -----------
     l. 199-17½
     -----------
```

```
        lb.
       326¾Saffron,at54s.8d.
        54  qr.           -------
      ------  ½ | ½ |     27-8
       1304   ¼ | ½ |     13-8
d.  |1630                -------
6½  |  163                41-0
2⅓  |   54—4             -------
        41—0 for the ¾
     -------------
      1786|2—4
     -------------
     l. 893-2-4
     -------------
```

When you take for 3 *qrs.* of any thing, firſt take $\frac{1}{2}$ of the given Price, and then the $\frac{1}{2}$ of that $\frac{1}{2}$, and add them together as above, or you may take the $\frac{1}{2}$ and $\frac{1}{4}$ Parts, and add them together; but the other is eaſier and quickeſt.

246¼

C.
$246\frac{1}{4}$ Fuſtick, at 11*s*. 6*d*.
246
6*d* $\frac{1}{2}$ 123
2829
2–$10\frac{1}{2}$ $\frac{1}{4}$ 2–$10\frac{1}{2}$
$\frac{1}{20}$ 283|11 $10\frac{1}{2}$
l. 141–11–$10\frac{1}{2}$ Anſwer.

Ells. *s*. *d*.
$216\frac{1}{5}$ Lawns, at 12–9
12
$\frac{1}{5}$ 2–$6\frac{1}{5}$
d. 2592
6 | $\frac{1}{2}$ | 108
3 | $\frac{1}{2}$ | 54
2–$6\frac{1}{5}$
275|6–$6\frac{1}{5}$
l. 137–16–$6\frac{1}{5}$

C. *lb*. *s*. *d*.
$134\frac{1}{2}$ 14 Raiſins, at 31 6 *per Cent.*
31 C
$\frac{1}{2}$ is $\frac{1}{2}$ 15 9
134 14 *lb*. $\frac{1}{4}$ 3 $11\frac{1}{4}$
402
19–$8\frac{1}{4}$ for $\frac{1}{2}$*C*. 14 *lb*. 19—$8\frac{1}{4}$
417|3—$8\frac{1}{4}$
l. 208–13–$8\frac{1}{4}$ Anſwer.

Here the even Parts of Weight muſt be obſerved, as they are ſet down in the Beginning of this Chapter: As for the $\frac{1}{2}$ *C*. you take half of the Price, and for 14 *lb*. you take $\frac{1}{4}$ of 15*s*. 9*d*. as being the $\frac{1}{4}$ of $\frac{1}{2}$ a *C*. &c.

Sums of this Kind, and many others, may as practically be done by *Multiplication* only (except taking the Parts) as it is taught in the firſt Chapter of this Book.

Examples.

C.			
75½ *Nicorage* Wood, at		22	6
			8
l.	9	00	0
			9
	81	00	0
	3	07	6
	0	11	3
l.	84	18	9

Here I multiply, firſt by 8, and then by 9; 8 times 9 making 72; and for the 3 odd Hundreds wanting, I multiply the Price by 3, and then I take half the Price for the ½ *C.* and add them together; as by the Work may be ſeen,

C.		s.	d.
63¾ Allom at		12	10 *per Cent.*
			7
	4	09	10
			9
l.	40	08	6
		6	5
		3	2½
l.	40	18	1½

Here I multiply by 7, and by 9; 7 times 9 making 63, the Quantity.

Hhds.

156 Wine at —— *l.* 12 *s.* 13 *per* Hhd.

		156
		12
s.		1872
10	$\frac{1}{2}$	78
2	$\frac{1}{5}$	15–12
1	$\frac{1}{2}$	7–16
		l. 1973–08

Or thus:

l.	*s.*
12	13
	10
126	10
	10
1265	00
632	10
75	18
l. 1973	08 Anſwer.

96 Fodder of Lead, at —— *l.* 8 13 4

		96
		8
s. d.		768
13–4	$\frac{2}{3}$	32
		32
		l. 832 Anſwer.

l. 8	13	4
		12
104	00	0
		8
l. 832	00	0

As for ſhort Methods of caſting up Bills of Parcels, &c. 'tis beſt to do them by *Multiplication*, as is directed in that Rule.

Here follow ſome Queſtions, with their Anſwers, for the Learner's Exerciſe.

75 C. ½ 19 *lb.* at 4*d.* ½. *per* Pound?	Anſ. *l.*	158	18	1½
71081 *lb.* at 35*s.* 6*d.* *per* C.	Anſ. *l.*	1126	10	1
67108 *oz.* at 16*d.* ¼. *per* lb.	Anſ. *l.*	283	19	8½
71 *lb.* 10 *oz.* 15 *dwt.* at 5*s.* 9*d.* *per* Ounce.	Anſ. *l.*	248	00	9¼
319 Yds. at 5*s.* 6*d.* *per* Ell.	Anſ. *l.*	70	03	7⅗
419⅞ Yds. at 4*s.* 10*d.* ½	Anſ. *l.*	102	16	10¾
47 Qrs. at 4*s.* 9*d.* *per* Buſh.	Anſ. *l.*	89	10	
715¼ Yds. at 4*s.* 10*d.* ⅛.	Anſ. *l.*	173	04	5⅞

59 Ounces, 11 *dwt.* 18 *gr.* at 5*s.* 7*d.* *per* Ounce.
Anſ. *l.* 16-12-8
50 *lb.* ¾ of Silk, at 20 *d.* *per* Oz. Anſ. *l.* 67-13-4
66 Groſs, at 3*s.* 9*d.* *per* Dozen. Anſ. *l.* 148-10-0
56 Load of Hay, at 18*d.* *per* Truſs. Anſ. *l.* 151-04-0

Sold 3 Sacks of Rice, Contents, *viz.*
N° 1—4 1 10 *Tare* 7 { *Clough* 2 *lb.* *per* Sack, *Tret*
2—3 2 19——8 { 4 *lb.* *per* 104 *lb.* at 10*d.* ½,
3—4 0 20——7 { *per lb.* Neat.
What comes the three Sacks to? Anſ. *l.* 56-4-11

For the deducting of *Tare*, *Tret*, &c. the Learner muſt have recourſe to the VIIth Chapter of this Book.

Sugar, 95 *C.* 1 *qr.* 19 *lb.* Groſs, Tare 12 *C.* 3 *qrs.* 10 *lb*, at 47*s.* 6*d.* *per C.* Neat, what comes the Sugar to at that Rate? Anſ. *l.* 196-2-6¼.

Other TABLES *of the even Parts of a* SHILLING, *and of a* POUND.

Parts of a Shilling.

10*d.*	is	5/6
9	is	3/4
8	is	2/3
7½	is	5/8
4½	is	3/8

Parts of a Pound.

18*s.*	is	9/10
17-6	is	7/8
16-8	is	5/6
15	is	3/4
14	is	7/10
13-4	is	2/3
12-6	is	5/8
8	is	4/10
7-6	is	3/8
6	is	3/10

If the Price of the Integer be at any of the Rates in either of theſe Tables, multiply the given Quantity by the Numerator, and divide by the Denominator, and the Quotient will be the Anſwer.

Examples.

d.
10 | $\frac{5}{6}$ | 456*lb.*Loaf Sugar,
5 (at 10*d.*
6)2280
38|0
l. 19 Anſ.

Foot.
9*d* | $\frac{3}{4}$ | 765 Glazing, at 9*d.*
3
4)2295
57|3-9
l. 28-13-9 Anſ.

C.
9*s.* | $\frac{9}{10}$ | 695 Shomac, at
9 (18*s.*
1|0)625|5
l. 625-10 Anſ.

6*s.* | $\frac{3}{10}$ | 950 Pr. Hoſe, at
3 (6*s.*
285|0
l. 285 Anſ.

746 Yds. Paving, at
3 (4*d.* $\frac{1}{2}$.
4*d*$\frac{1}{2}$ | $\frac{3}{8}$ | 2238
27|9-9
13-19-9 Anſ.

lb.
671 *Joppa* Soap,
5 (at 7*d.* $\frac{1}{2}$.
7*d*$\frac{1}{2}$ | $\frac{5}{8}$ | 3355
41|9-4$\frac{1}{2}$
l. 20-19-4$\frac{1}{2}$

lb.
694 *Belladine* Silk,
7 (at 17*s.* 6*d.*
17*s*6*d* | $\frac{7}{8}$ | 4858
l. 607-5 Facit.

842*lb.* Rhubarb, at
2 (13*s.* 4*d.*
13*s*4*d* | $\frac{2}{3}$ | 1684
l. 561-6-8 Anſ.

Other Examples in Practice, promiſcuouſly ſet, aud moſt expeditiouſly wrought.

Gal. *d.*
d. | 4 | 1536 at 15 *per* Gall.
15 is
$\frac{1}{16}$ of | 4 | 384
a *l.*
l. 96 **Facit.**

8*d.* $\frac{1}{30}$ | 7694 *lb.* Tobacco, at
of a *l.* | (8*d. per lb.*
l. 256-9-4

5*s.* $\frac{1}{4}$ | 205 Yds. at 7*s.* 6*d.*
2*s.*6*d.* $\frac{1}{8}$
of a *l.*
51—5
25-12-6
Facit *l.* 76-17-6

40*s.* { 125 Pcs. at 2*l.* 5*s.* 6*d.*
{ 125 (*per* Pce.
5*s.* $\frac{1}{4}$ | 31-5
6*d.* $\frac{1}{10}$ | 3-2-6
of 5*s.*
l. 284-7-6 Facit.

75C. $\frac{1}{2}$ Logwood, at
2*s.*6*d.* $\frac{1}{8}$ 9-07-6 (22*s.* 6*d.*
the $\frac{1}{2}$ C. 1-1-3
l. 84-18-9 Facit.

lb. *d.*
| 5 | 7490 at 16 *per lb.*
16*d.* is
$\frac{1}{15}$ of | 3 | 1498
a *l.*
l. 499 $\frac{1}{3}$ Facit.

756 Gall. at 5*s.* 8*d.*
5*s.* $\frac{1}{4}$ 189
8*d.* $\frac{1}{30}$ 25-4
l. 214-4 Facit.

170*lb.* Raw Silk, at
(16*s.* 8*d.*
10*s.* $\frac{1}{2}$ 85
6*s.* 8*d.* $\frac{1}{3}$ 56-13-4
l. 141-13-4 Facit.

215C. of Hops, at 3*l.*
(17. 6*d.*
860
Subt. $\frac{1}{8}$ 26-17-6
l. 833-02-6 Facit.

Days.
365 at 5*d.* *per* Day.
6*d.* $\frac{1}{40}$ 9—02—6
Subt. $\frac{1}{12}$ 1—10—5
l. 7—12—1 Anſ.

26812 *lb.* at 19*d.*
20*d.* $\frac{1}{12}$ 2234—06—0
Subt. $\frac{1}{20}$ 111—14—4
l. 2112—12—4

3796 Yards, at 22*d.*
20*d.* $\frac{1}{12}$ 316—06—8
2*d.* $\frac{1}{120}$ 31—12—8
l. 347—19—4

75 *C.* at 20*s.* 8*d.*
4*d.* $\frac{1}{60}$ 1—5
4*d.* $\frac{1}{60}$ 1—5
l. 77—10

C. *qrs.* *lb.*
12 3 14 Long Pepper, at
l. 3 10 6
12
42—06—0
$\frac{1}{2}$ *C.* the $\frac{1}{2}$ 1—15—3
$\frac{1}{4}$ a $\frac{1}{2}$ of the $\frac{1}{2}$ *C.* 17—7 $\frac{1}{2}$
14 *lb.* the $\frac{1}{2}$ of $\frac{1}{4}$ *C.* 8—9 $\frac{3}{4}$
Facit *l.* 45—07—8 $\frac{1}{4}$

lb.
6709 at 21*d.*
2*s.* $\frac{1}{10}$ 670—18
Subt. $\frac{1}{80}$ for 83—17—3
3*d.* over.
Anſw. *l.* 587—00—9

When it happens that the Price of the Integer is a known Part of a Pound, as 17*s.* 6*d.* is $\frac{7}{8}$, 13*s.* 4*d.* is $\frac{2}{3}$, 16*s.* 8*d.* is $\frac{5}{6}$, and 7*s.* 6*d*, $\frac{3}{8}$, *&c.* then multiply the given Number by the Numerator, and divide the Product by the Denominator: Or divide by the Denominator, and multiply by the Numerator. See the following Work.

Examples.

420 Yds. at 7*s*. 6*d*.	Or thus:
3	8)420
8)1260	52—10
	3
l. 157 10 Facit.	Anſw. *l.* 157—10

479 Ells, at 17*s*. 6*d*.	Or thus:
7	Subtract $\frac{1}{8}$ from the given Numb. *l.* 59—17—6
8)3353 $\frac{7}{3}$	7
l. 419 $\frac{1}{8}$ or 2*s*. 6*d*.	Facit *l.* 419—2—6

697 Gall. at 16*s*. 8*d*.	Or thus:
5	Sub. $\frac{1}{6}$ from the given Numb. *l.* 116—03—4
6)3485	5
l. 580 $\frac{5}{6}$ or 16*s*. 8*d*.	Facit *l.* 580—16—8

CHAP. XIII.

COMPANY.

THIS Rule teaches (by knowing the Parts of which a Joint Stock is compoſed, with a ſuppoſed *Gain* or *Loſs* reſulting therefrom by Trade) to eſtimate or determine each Perſon's particular Share of the *Gain*, or *Loſs*, in proportion to his Principal in the Joint Stock.

By this Rule may alſo a Bankrupt's Eſtate be divided among his Creditors. Likewiſe Legacies, *&c.* adjuſted, in caſe of a Deficiency of Aſſets, or Effects; and many other Things.

I. Queſtions in this Rule are worked by the *Rule of Three*, there being to be as many ſeveral Statings as there are Members in the Joint-Stock, if none of their Stocks be alike.

II. The Total Sum of the ſeveral Stocks is to be the firſt Number in the *Rule of Three*; the *Gain* or *Loſs*, the ſecond, and each Man's particular Stock, the third.

Example 1.

A and *B* enter into Partnerſhip: *A* puts into Stock 230*l.* and *B* 320*l.* and after twelve Months Trade, they have gained 165*l.* how much muſt each Perſon have of the *Gain*, in proportion to his Money in Company.

230*l.* *A.*
320 *B.*

If 550 gain 165, what 230*l.* *A*'s Stock?
230

4950
330

55|0)3795|0(69 *l.* *A*'s Share.
330

495
495

(0)

Again, if 550 *l.* gain 165 *l.* what 320 *l.* *B*'s Stock.

```
        320
       ----
       3300
       495
      -----
55|0)5280|0(96 l. B's Share.
      495    69   A's Share.
      ---   ---
      330 . 165 Proof.
      330 ---
      ---
      (0)
```

Here I add their ſeveral Stocks together, and they make 550 *l.* which is the firſt Number in the *Rule of Three*; the *Gain*, viz. 165 *l.* the ſecond; and 230 *l.* the Stock of *A*'s the third Number which makes the Stating, which being worked according to Rule, the Anſwer gives *A* 69 *l.* for his Share. Then 'tis again repeated, and then the Stock of *B* 320 *l.* is the third Number; and after working the ſecond Stating there ariſes 96 *l.* for the Share of *B* in the *Gain*, which two Shares being added together, make the total *Gain*, viz. 165 *l.* and is a ſure Proof the Work is right, and that each Perſon had his juſt Proportion of the Profit.

Example 2.

Three Perſons, *A*, *B*, and *C*, join in Company; *A*'s Money in Stock is 750 *l.* *B*'s 460 *l.* and *C*'s 500 *l.* and after a certain Time, when they ſettle their Accounts, find their neat Profit 684 *l.* What muſt each have of the *Gain?*

```
Gain?  750 l.
       460
       500
      -----
If 1710 l. gain 684 l. what 750 l.  Anſ. l. 300 A
   1710    gain 684,  what 460?             184 B
   1710    gain 684,  what 500?             200 C
                                           ------
                                   Proof, l. 684
```

Example 3.

Admit four Perſons make a joint Adventure to Sea, *A* ſends 60*l.* in Tobacco, *B* 80*l.* in Cloth, *C* 120*l.* in Leather, and *D* 140*l.* in Silk Hoſe; and after they have diſpoſed of their Returns, their neat Profit amounts but to 72*l.* what is each Man's Share of the ſaid 72*l.* ?

					l. *s.*
If 400*l.*	gain 72*l.*	what 60*l.* ?	Anſw.	*A*	10—16
If 400	gain 72	what 80 ?		*B*	14—08
If 400	gain 72	what 120 ?		*C*	21—12
If 400	gain 72	what 140 ?		*D*	25—04
					l. 72—00

The common Way of having ſo many Statings and Workings, as there are Partners in the Concern, being intolerably tedious, I have here ſet down a much more compendious Method of working Sums belonging to this Rule; and though it is derived from *Decimals*, yet it will well enough anſwer our End by a *Vulgar Operation*, which is this: Annex a Cypher, or Cyphers, to the middle Number (except it be big enough to divide without, which it very rarely is) and then divide it by the firſt Number or total Sum of the Stocks; and then by that Quotient, multiply each Perſon's particular Stock, and the Products will be each Man's proportional Share in the *Gain* or *Loſs*. But you muſt obſerve, that when you have multiplied each Perſon's particular Stock by the Quotient aforeſaid, you muſt point, or ſtrike off to the Right-hand ſo many Figures or Cyphers as you annex Cyphers to the Sum to be divided.

Or *Examples* in this Rule may be ſhortned by finding the proportional *Gain* or *Loſs* of one Pound; thus: Bring the *Gain* or *Loſs* into Pence, and divide thoſe Pence by the Total of the Stocks, and the Quotient ſhews what it is *per* Pound; and then the Anſwer may be found by the Rules of *Practice*, &c.

Example *by the ſaid propoſed Method.*

For a Specimen, let us take the firſt *Example* in this Rule, where the Sum of the Stocks was 550 *l.* and the total Gain 165 *l.* Here I cannot divide 165 by 550; wherefore I join a Cypher to 165, thus, 1560; and then divide it by 550, and the Quotient is 3; by which I multiply 30*l.* the Stock of *A*, and it produces 690, and the Cypher on the Right-hand being pointed off, for the Cypher annexed to the Dividend, there is left 69*l.* for *A*'s Share in the Gain. Then I multiply *B*'s Stock, 320 by the ſaid Quotient 3, and the Product is 960, then cutting off the Cypher, there remains 96*l.* for *B*'s Share, &c. which are the ſame Anſwers as by the other Way.

The 2d *Example* worked by this ſhorter Way.

$$\left.\begin{array}{l} A\ 750 \\ B\ 460 \\ C\ 500 \end{array}\right\}\ \text{The Gain is } 684\ l.$$

1710)6840(4 the common Multiplier.
6840

(0)

750 *A*'s Stock.
4

l. 300|0 *A*'s Share of the Gain. — — *l.* 300

460 *B*'s Stock.
4

l. 184|0 *B*'s Share of the Gain. — — *l.* 184

500 *C*'s Stock.
4

l. 200|0 *C*'s Share of the Gain. — — *l.* 200

Proof, *l.* 684

The third *Example* by the ſhorter Method ſtands thus :

l. Parts.		*l.*		*s.*
10 8	*i. e.*	10 Eight Tenths of a *l.*	or	16
14 4		14 Four Tenths of a *l.*		8
21 6		21 Six Tenths of a *l.*		12
25 2		25 Two Tenths of a *l.*		4
Fac. *l.* 72 0		72		00

Example 4.

Divide *l.* 5760-10 among ſeveral Perſons, ſo that *A* may have $\frac{1}{2}$, *B* $\frac{1}{3}$, *C* $\frac{1}{4}$, *D* $\frac{1}{6}$, and *E* $\frac{1}{8}$, and tell me each Man's Part.

In this, and ſuch like Caſes, take a Number out of which ſuch Parts may be taken ; and take the like Parts of that Number, to find the Numbers you ſeek, *viz.* each Man's juſt Proportion, *&c. See the following Work, and Anſwers.*

20*s.* Then ſay, If 27*s.* 6*d.*—5760*l.* 10*s.* what 10*s.* &c.

$\frac{1}{2}$	10	0	*Remainders.*		2094	14	06	*A.*
$\frac{1}{3}$	6	8	18		1396	09	08	*B.*
$\frac{1}{4}$	5	0	12		1047	07	03	*C.*
$\frac{1}{6}$	3	4	9		698	04	10	*D.*
$\frac{1}{8}$	2	6	6		523	13	07	*E.*
			21				2	
	27	6	—					
	12		33|0)66|0(2*d.*	*Prin.*	5760	10	00	
	330							

Example 5.

In like manner may be done that Queſtion ſo often critically propoſed, *viz.* of dividing 20*s.* into $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{1}{6}$ Parts. *See the following Work.*

$\frac{1}{3}$
4

12 If 342 *d.* pay 20 *s.* what 120 *d.* &c.
5

60
6 If 342 pay 20, what 90, &c.

360 Common Denominator.

$$\left.\begin{array}{r}\frac{1}{3}\\ \frac{1}{4}\\ \frac{1}{5}\\ \frac{1}{6}\end{array}\right\}\begin{array}{c}\text{of}\\ 360\end{array}\left\{\begin{array}{r}120\\ 90\\ 72\\ 60\end{array}\right\}\begin{array}{rrr} s. & d. & \text{Parts.}\\ 7 & 0— & 72\\ 5 & 3— & 54\\ 4 & 2— & 180\\ 3 & 6— & 36\end{array}$$

1st Numb. 342 20 0—342 makes 1 to carry, because *the Rule of* 3————(*is* equal to the Divisor 342.

Example 6.

Suppose a *Bankrupt*'s Money and Effects amounts to 811 *l.* 10 *s.* and he owes to several Persons as follows, *viz.*

	l.	*s.*	*d.*
To Mr. *Cruel*	220	16	6
Mr. *Gripe*	312	00	0
Mr. *Hard*	117	12	6
Mr. *Covet*	106	12	6
Mr. *Near*	200	06	0
Mr. *Squeeze*	124	12	6
	l. 1082	00	0

How much must each Person have of the abovementioned 811 *l.* 10 *s.* in proportion to his Debt?

	l.	*l.*	*s.*		*l.*	*s.*	*d.*
If	1082—	811	10,	what	220	16	6?
				Answer	*l.* 165	12	4 $\frac{1}{2}$.

Or

Or nearer, by ſeeing firſt, what it comes to in the Pound (as mentioned in Page 235,) and then work each particular Sum by *Practice*. Thus, bring 811 *l.* 10 *s.* into Pence, and then divide thoſe Pence by 1082, the Pounds that are owing, and the Quotient ſhews what it is in the Pound, *viz.* 15 Shillings. Then proceed for further Solution thus :

What comes *l.* 220–16–6 to, at 15 *s.* *per* Pound ?

s.					
		l. 220	16	6	at 15 *s.* *per l.*
10	$\frac{1}{2}$	110			
5	$\frac{1}{2}$	55			
			12	4 $\frac{1}{2}$	for the 16 *s.* 6 *d.*
		Anſw. *l.* 165	12	4 $\frac{1}{2}$	

And ſo of the reſt, ſee the following Anſwer. Or ſhorter by taking $\frac{3}{4}$ of each Perſon's Debt, becauſe 15 *s.* is $\frac{3}{4}$ of a Pound.

Mr. *Cruel* muſt have ——— ———	*l.* 165	12	4 $\frac{1}{2}$
Mr. *Gripe* ——— ———	234	00	0
Mr. *Hard* ——— ———	88	04	4 $\frac{1}{2}$
Mr. *Covet* ——— ———	79	19	4 $\frac{1}{2}$
Mr. *Near* ——— ———	150	04	6
Mr. *Squeeze* ——— ———	93	09	4 $\frac{1}{2}$
Proof,	*l.* 811	10	0

With Time.

When this Rule hath any Relation to a particular Time, then you muſt multiply each Man's particular Stock of Money by the reſpective Times it continues in the Joint-Stock, and add all the Products together ; which Total muſt be the firſt Number in the *Rule of Three* ; the Gain or Loſs the ſecond, and each Man's

Stock multiplied by his Time the third; and then work as before, and as often repeat as there are Partners, &c.

Example 1.

A and *B* enter into Company; *A* puts into Stock 120*l.* for 7 Months, and *B* puts 230*l.* for 10 Months; and in Trading they gain 100*l.* what is each Man's Share, in Proportion to his Stock and Time? See the Work ſollowing:

120*l.* *A*'s Stock. 230*l.* *B*'s Stock.
7 Months, *A*'s Time. 10 Months, *B*'s Time.

840 *A*'s Stock and Time, 2300 *B*'s Stock and Time.
2300

If 3140—gain 100*l.* what 840, *A*'s Stock and Time.
Again,
If 3140—gain 100*l.* what 2300, *B*'s Stock and Time.

					Parts.	
Anſwer.	*l.* 26	15	00	¼	1660	*A.*
	73	04	11	¾	1480	*B.*

Proof, *l.* 100———3140 *A Far.*

Or the Anſwers may be known by finding a common Multiplier, as directed in Page 235; or by finding the proportional Part of the Gain due to one Pound, as mentioned in the ſame Page.

Example 2.

Three Perſons enter into Partnerſhip, *viz.* *A*, *B*, and *C*. *A* puts into Stock 65*l.* for 8 Months, *B* 78*l* for 12 Months, and *C* 84*l.* for 6 Months, and they gain 166*l.* 12*s.* what is each Man's Share, &c?

A's Stock multiplied by 8 produces 520
B's Stock multiplied by 12 gives 936
C's Stock multiplied by 6 produces 504

1960 Sto. & Ti.

Then ſay,

S and *T*. *l.* *s.* *l.* *S.* and *T.*
If 1960 gain 166 12 (or 166,6) what 520?
Anſw. 44*l.* 4*s.* (or 44,2) &c.

CHAP. XIV.

BARTER.

BARTER, or TRUCK, is no more than exchanging one Commodity for another, and ſo to proportion their Rates, as that neither of the Perſons may ſuſtain Loſs.

Example 1.

Suppoſe *A* has 144 Ells Linen Cloth, worth 15*d. per* Ell, which he would *truck* with *B* for Butter at 18*s.* 9*d. per* 100 *lb.* how many Pounds of Butter muſt *B* give *A* for the Linen? Anſw. 960 Pounds.

The conciſeſt Way to anſwer Queſtions in this Rule, is firſt to find the Value of the firſt Goods mentioned, by the ſhorteſt Way of *Practice*; and then to anſwer it by the *Rule of Three.*

Then ſay,

15*d.* is $\frac{1}{16}$ of a *l.* { 4)144 Ells, at 15*d.*
4)36

l. 9 or 180*s.*

Then ſay,

If 18$\frac{3}{4}$*s.* give 100*l.* what 180*s.* &c.
Anſwer 960 Pounds.

To prove the Work, caſt up the 960 *lb.* at 2*d.* $\frac{1}{4}$ *per lb.* (for it is ſo much *per lb.* at 18*s.* 9*d.* *per* 100 *lb.*) and if it amounts to 9*l.* the Value of the Linen, the Work is right. Thus:

2*d.* $\frac{1}{120}$ of a *l.* | 96,0 at 2*d* $\frac{1}{4}$ *per* lb.
$\frac{1}{4}$ or $\frac{1}{8}$ of 2*d.* | 8
| 1
l. 9 Facit.

Example 2.

A has Broad Cloths at 10*l.* 10*s.* *per* Piece, and *B* hath Mace, at 12*s.* *per* lb. how many Pounds of Mace muſt *B* give *A* for 24 Broad Cloths? Anſ. 420 Pounds.

240
12

If 12*s.*——1*lb.* what 252*lb.* &c.

Example 3.

A hath 14 *C.* Weight of Sugar, at 6*d.* *per lb.* for which *B* gave him 1 *C.* $\frac{3}{4}$ of Cinnamon, what was the Cinnamon rated at *per lb.*

14
14
14
14

112 6*d.* $\frac{1}{40}$ of *l.* 156,8
84
If 196 Coſt *l.* 39,4, what 1 *lb.* Anſwer 4*s.*

Example 4.

A and *B* barter, *A* hath 86 Gallons of Brandy, worth 9*s.* 2*d.* *per* Gallon ready Money, but in Barter he will have 11*s.* *per* Gallon: *B* hath Serge worth 2*s.* 1*d.* *per* Yard ready Money. *Quere*, How many Yards of Serge muſt *B* give *A* for his 86 Gallons of Brandy?

The Rule. Firſt find what Advance *B* ought to make *per* Yard for his Serge, in proportion to what *A* hath done upon a Gallon of his Brandy. Thus:

If 9*s.* 2*d.* increaſe to 11*s.* what muſt 2*s.* 1*d.* increaſe to? Anſw. 2*s.* 6*d.*

Then ſee by Practice what *A*'s Brandy comes to at 11*s.* *per* Gallon, which will be found to amount to 47*l.* 6*s.* then ſay by the *Rule of Three.*

s. d. *Yard.* *l. s.*
If 2 6 buy 1 what will 47 6 buy?
Anſw. 378 Yards $\frac{1}{5}$.

And ſo of any other *Example* in this Rule of this Kind.

CHAP. XV.

INTEREST

IS an Allowance of the Borrower to the Lender, in conſideration of the Uſe made of the Lender's Money; and therefore *Intereſt* ſometimes is called Uſe Money, and this *Intereſt* is either *Simple* or *Compound.* *Simple Intereſt* is that which cometh of the *Principal* only; and *Compound Intereſt* is that which ariſes from

Principal and *Intereſt* alſo, and is therefore called *Intereſt* upon *Intereſt*; but this latter being accounted very unlawful, is ſeldom allowed, but in ſome particular Agreements, *&c.* I ſhall therefore not inſiſt upon it; but as to the former, to wit, *Simple Intereſt*, I ſhall endeavour at ſome practical Rules and Methods to render it eaſy to the meaneſt Capacity; and ſhew alſo, that by the Methods of working *Intereſt*, ſeveral other uſeful Things are anſwered, that do not come under that Denomination.

Example 1.

What comes the Intereſt of a Bond of *l.* 374 12 9 to, at 6*l.* *per Cent.* for a Year?

Rule. Multiply the Principal Money by the Rate of *Intereſt*, be it what it will, and divide by 100. State it thus:

```
      l. P.      l. I.     l. P.  s.  d.
If 100 l. gain 6, what     374   12   9
                                      6
                          ------------
                          22|47  16   6
                             20
                       -------
                       9|56 ⎫
                         12 ⎪
                       ---- ⎪  l.  s.  d.
                       6|78 ⎬ 22  9  6 ¾ 12/100.
                          4 ⎪
                       ---- ⎪
                       3|12 ⎭
```

Here I multiply the third Number by the ſecond according to *Multiplication of Money*, and the Product is *l.* 2247–16–6, which I divide by 100, by cutting off two Figures with a Daſh of the Pen, which is dividing by 100, according to the 6th Rule of the 5th *Chapter*, then I multiply the ſeveral Remainders by 20, by 12, and by 4, and ſtill divide by 100, as before, and the Anſwer is *l.* 22–9–6–¾–12/100; as may be ſeen by the

Work above. And the Truth may be proved by ſtating and working it back again, thus:

	l.P.	*s.*	*d.*		*l.I.*	*s.*	*d.*		*l.P.*
If	374	12	9	gain	22	9	6¾, $\frac{12}{100}$,	what	100?

Example 2.

What is the Intereſt of *l.* 826 13 9, for a Year, at 5 *per Cent.*

826 13 9
5
41|33 8 9
20
6|68
12
8|25
4
1|00

l. 41 6 8¼.

Shorter thus:

$\frac{1}{20}$|82|6 13 9

Facit. *l.* 41|6 08¼

In the ſhorter Method, I conſider that the Rate of *Intereſt*, viz. 5 *per Cent.* is the 20th Part of 100 *l.* wherefore I take that Part of the Principal Money, which is done only by halving it, thus: The ½ of 8 is 4, and the ½ of 2 is 1, or 41 *l.* and 6 cut off is (for the Cypher in $\frac{1}{20}$) 6*s.* and the 13*s.* 9*d.* reduced into Pence by your Head or Pen, makes 165, and ſuppoſing the 5 cut off, the ½ of 16 is 8 Pence; and 5 reduced into Farthings make 20, and ſuppoſing the 0 to be cut off from that likewiſe, the ½ of 2 is ¼, and ſo the Anſwer is the ſame with the other, *viz.* *l.* 41-6-8¼; and the moſt conciſe Method that can be.

Example 3.

What's the *Simple Intereſt* of
l. 34|8 13 2 at 6 *per Cent?*

17 08 7¾ } $\frac{1}{20}$ for 5 *per Cent.*
3 09 8¾ } $\frac{1}{5}$ for 1 *per Cent.*

Facit, *l.* 20 18 4½

Example 4.

What's the Intereſt of *l.* 746-12-6, at 5½ *perC.*
5

3733-02-6
The ½ of 746 *l.* &c. 373-06-3

41|06-08-9
20
1|28
12
3|45
4
1|80
} *l.* 41 01 3$\frac{3}{2}$

Sooner thus:
746 12 6

$\frac{1}{20}$ | 37 06 7½
$\frac{1}{10}$ | 3 14 7¾

l. 41 01 3¼ Facit.

Thus by either of theſe Ways may the Intereſt of any Sum of Money, for a Year, be found, at any Rate, *per Cent*. Likewiſe by the ſame Method of working, may the Proviſion, Commiſſion, or Factorage of any Sum be known: As alſo Inſurance, Average, Storage, Brokerage, or any thing elſe, rated at ſo much *per Cent.*

What is the Factorage of Goods bought, or otherwiſe negociated, to the Value of *l.* 479 16 9 at 2 *per Cent.*

479 16 9
2
9|59 13 6
20
11|93
12
11|22

Answ. *l.* 9-11-11

Or thus:

2 *per Ct.* $\frac{1}{50}$ 479 16 9

Facit, *l.* 9 11 11

What is the Inſurance of 230*l.* at 10$\frac{3}{4}$ *per Cent.*

l. 2300 —— 10 *per Cent.*
115
57 10
24|72 10
20
14|50
12
6|00

l. 24-14-6

Or thus:

10 *per* Cent. *l.* 23 | 0
10*s.* $\frac{1}{20}$ | 1 3
5 | $\frac{1}{2}$ | 11 6
24 14 6

This Method may be of good Uſe, for taking off 5 *per* Ct. for prompt Payment in Cuſtom-Houſe Duties, and 15 *per* Cent. the additional Duty on *French* and *Eaſt-India* Goods. Admit I were to take off 5 *per* Cent. from

	l. 275	12	
Subtract $\frac{1}{20}$	13	15	07
Anſw.	*l.* 251	16	05

Again, take off 15 *per* Cent. from	*l.* 672	16	08
$\frac{1}{10}$	67	05	08
$\frac{1}{2}$	33	12	10
Subtract	100	18	06
Anſw.	*l.* 571	18	02

Once

Once more take 25 *per* Ct. from *l.* 321 12 4

5 *per* Cent. $\frac{1}{25}$ 16 01 $7\frac{1}{4}$

5

Deduct. 80 08 $\frac{1}{4}$ 25 *per* C.

Anſw. *l.* 241 04 $3\frac{3}{4}$

Example 5.

What comes the Intereſt of *l.* 446–12 to, for 9 Months, at 6 *per* Cent. *per Annum?*

Here I take the $\frac{1}{2}$ of the Year's Intereſt for 6 Months, and then the $\frac{1}{2}$ of that for 3 Months, and add them together for 9 Months, as in the following Work:

l. 446 12

6 *per* Cent.

26|79 12

20

15|92

.12 *l.* 26 15 $11\frac{4}{100}$ for a Year.

11|04 6 Mon–13 07 11 $\frac{1}{2}$ for $\frac{1}{2}$ a Year.

3 Mon—6 13 11 $\frac{3}{4}$ for $\frac{1}{2}$ *ditto.*

l. 20 01 11 $\frac{1}{4}$ for 9 Months.

Example 6.

To what comes the Intereſt of *l.* 297–12, at 5 *per* Cent. for 6 Months? Anſwer *l.* 7–8–$9\frac{1}{2}$.

l. 14 17 7 for a Year.

Take $\frac{1}{2}$ for 6 Months. } *l.* 7 08 $9\frac{1}{2}$ Anſwer.

When at any Time the Rate of Intereſt hath ¼, ½, or ¾ annexed, you muſt firſt multiply by the whole Numbers, and then take ¼, ½, or ¾, of the Principal Money, (as is taught in the 13th Rule of the 4th Chapter) and add the two Lines together, and then divide by 100, as before.

Example 7.

What is the Intereſt of *l.* 376 12 6
at *l.* 4¼. *per* Cent?

```
                                   376   12   6
                                              4
                                  -------------
For the ½ per Cent. take          1506   10   0
  half of the Principal.           188   06   3
                                  -------------
                             ┌ 16 | 94   16   3
                             │      20
                             │ -------
                             │ 18 | 96
                             │      12
Anſwer l. 16-18-11½         <  -------
                             │ 11 | 55
                             │       4
                             │ -------
                             └  2 | 20
```

Example 8.

What is the Intereſt of *l.* 226 10
at 4¾ *per* Cent.

```
                                  226   10
                                        3¾
                                  --------
per Cent. ┐                       679   10
    ¼     ├  | ½ |                113   05
          ┘  | ½ |                 56   12   6
                                  ------------
                             ┌ 8 | 49   07   6
                             │     20
                             │ -------
                             │ 9 | 87
                             │     12
Anſw. l. 8-9-10½            <  -------
                             │10 | 50
                             │      4
                             │ -------
                             └ 2 | 00
```

Another

Another Way (when the Time is odd, or not juſt a Year) is to multiply the Principal by the Intereſt of 100 *l.* for the nominated Time, cutting off two Figures to the Right-hand; as before.

Example 1.

What's the Intereſt of *l* 234 12 6 for 2 Years, at 5 *per* Cent. The Int. of 2 Yrs. at 5 *per* Cent. } 10 *l.*

23|46 05 0
20
9|25
12
3|00

} *l.* 23-9-3

Example 2.

What is the Intereſt of *l.* 312 16 for 5 Years, at 6 *per* Cent.

5 and 6

1564 00
6

93|84
20
16|80
12
9|60
4
2|40

Anſw. *l.* 93 16 9½

Here the Intereſt of 100 *l.* for the Time, is 30 *l.* therefore I multiply by the Ratio's of 30, *viz.* 5 and 6; as in the Example.

Example 3.

What is the Intereſt of *l.* 428–14, for 9 Mon. at 4 [*per* Cent.

The Intereſt of 100 *l.* for 9 Mon. at 4 *per* Ct. } is 3 *l.*

$$\begin{array}{r} 12|86\;\;2 \end{array}$$

$$\left.\begin{array}{r} 20\\ \hline 17|22\\ 12\\ \hline 2|64\\ 4\\ \hline 2|56 \end{array}\right\} l.\ 12 — 17 — 2\tfrac{1}{2}$$

$$\text{When the Rate is at}\left\{\begin{array}{c}5\\6\\4\\3\end{array}\right\}\textit{per}\text{ Cent. for}\left\{\begin{array}{c}12\\10\\15\\20\end{array}\right\}\text{Months.}$$

Then the Intereſt of any Principal, is juſt ſo many Shillings as there are Pounds; therefore only take $\frac{1}{20}$ of the Principal, *&c.*

Example 1.

What's the Intereſt of —— *l.* 412 06 9 at 5 *per Cent.* for 12 Months?

$\frac{1}{20}$ 20 12 4 $\frac{1}{20}$ Anſw.

Example 2.

What's the Intereſt of —— *l.* 324 12 0 at 6 *per Cent.* for 10 Months?

$\frac{1}{20}$ 16 04 7 $\frac{4}{20}$ Anſw.

Example 3.

What's the Intereſt of——*l.* 428 16 4 at 4 *per Cent*. for 15 Months?

$\frac{1}{20}$ 21 08 $9\frac{1}{4}$ Anſw.

Hence it neceſſarily follows, that the Intereſt of any given Principal may be found, by taking Parts for the Time propoſed, out of the Time mentioned in the foregoing Table; thus: if the Intereſt of *l.* 412-6-9 for 12 Months, be 20*l.* 12*s.* 4*d.* $\frac{1}{2}$, as in Page 251, at 12*d.* in the Pound, then for 6 Months it muſt be $\frac{1}{20}$, *viz.* 10-6-$2\frac{1}{4}$; and for 3 Months $\frac{1}{4}$.

Examples.

What's the Intereſt of—20)276 05 9 for 4 Months, at 5 *per Cent*.

13 16 $3\frac{1}{4}$

4 Months $\frac{1}{3}$ of
12 Months. *l.* 4 12 1 Anſ. for 4M.

Again, what's the Intereſt of 20)157 09 0 for 5 Months a 6 *per Cent*..

7 17 $5\frac{1}{4}$

5 Months $\frac{1}{2}$ of
10 Months. *l.* 3 18 $8\frac{1}{2}$

And ſo for 4 or 3 *per Cent*. for 15 or 20 Months, in the ſame Manner.

When the *Principal Money* is any Number of Pounds, without Shillings or Pence, then it may be done by the following Method of working.

Example.

What's the Intereſt of 40*l.* for 7 Years, 5 Months, and 26 Days, at 6 *per Cent. per Annum?*

Years. *Mon.* *Days.*
7 5 26
12 Months in a Year.

89
30 Days in a Month.

2696
40 Principal Money.

1|00)1078|40
Groats 6|0)107|8
in all.
l. 17 58 Groats, or 19*s.* 4*d.* and 1*d* ½ for the (Fraction.

Here the Time is ſet down, and multiplied by 12, the Calendar Months in a Year, and the odd Months taken in, and then by 30, the ſuppoſed Days in a Month, and the odd Days taken in likewiſe, which Product of Days, is multiplied by the Principal Money, *viz.* 40*l.* which Product is divided by 100, and then that Quotient by 60, the Groats in a Pound, and the Remainder is Groats, *viz* 58, which is 19*s.* 4*d.* and 1*d.* ½ for the Fraction, in all *l.* 17–19–5½: As in the Work.

Example.

What is the Intereſt of 590*l.* for 3 Years, 7 Months, and 19 Days, at 6 *per Cent. per Annum?*

Years. *Mon.* *Days.*
3 7 19
12 Months in a Year.

43
30 Days in a Month.

1309
590 Principal Money.

117810
6545

1|00)7723|10
6|0)772|3

Anſw. *l.* 128.43 Groats, or 14*s*.4*d*.

In all, *l.* 128-14-4.

There is alſo another Way of calculating *Intereſt*, by Days, which is thus: Bring the Principal Money into Pence, then multiply theſe Pence by the Days it is out at Intereſt, and if the Rate be at 6 *per Cent.* then divide by 6083, which is what is produced by the Days of the Year multiplied by 100, and divided by the Rate of Intereſt; but if the Rate be 5 *per Cent.* then divide by 7300.

Example.

What is the Intereſt of 150*l.* for 10 Months and 24 Days, at 5 *per Cent. per Annum*?

l. 150
20
3000
12
36000
324 Days at Intereſt
144000
72000
108000
11664000

Mo. Days.
10—24
30
324
—12)
73|00)116640|00(1597
13|3—1
Anſw. *l.* 6-13-1

Another Rule *by* Days.

Multiply theſe three Numbers continually, *viz.* the given Intereſt of 100*l.* for a Year; the Principal whoſe Intereſt is required: And laſtly, the Number of Days required; and the laſt Product is to be reſerved for a Dividend. Then multiply 365 Days by 100, (which is only annexing two Cyphers) and let that Product be your Diviſor; (which ſerves for all Rates) and then divide as uſual, and the Quotient will be the Intereſt ſought.

Note here, That the two Principals, *viz.* 100*l.* and the other propoſed, are ſuppoſed to be of one Denomination: alſo the Intereſt required will be of the ſame Name with the given Intereſt of 400*l.*

Example.

What is the Intereſt of 400*l.* for a Week, or ſeven Days, at 6 *per Cent. per Annum?*

```
                              400
                                6
                             ----
   365                       2400
   100                          7
  -----                     -----
  36500 Diviſor            )16800( Dividend.
```

Anſw.

36500)16800,000(4602 or 9*s.* 2*d.* ¼.

Here in valuing, the Farthings are always leſſened by one.

When the Rate is 5*s.* *per Cent.* take the ¼ of the Principal, and work as before.

What is the Brokerage of *l.* 465 12 6 at 10*s.* *per Cent.*

```
                      l. 465  12  6
                      -------------
                    ½ 2|32    16  3
                         20
                        ----
                        6|75
                          12
Anſwer l. 2-6-6¾ {     -----
                        6|56
                           4
                       -----
                        3|00
```

If you would know what any Sum comes to, at 30, 40, or 50 *per Cent.* firſt ſee what it comes to at 10 *per Cent.* and then multiply that Anſwer by 3, 4, or 5, *&c.*

Example.

What comes *l.* 726 10 6 at 40 *per Cent?*
10

72|65 05 0
l. 72–13–0½ 10 *per Ct.* 20
4
13|05
l. 290–12–2 Anſw. 12
60
4
2|40

CHAP. XVI.

DISCOUNT

IS when a Sum of Money hereafter due, is ſatisfied by paying down ſo much preſent Money, which if put to Intereſt (at ſuch a Rate, and for ſuch a Time) would increaſe itſelf to the Sum firſt due.

Example 1. What is the *Diſcount* of *l.* 487–12 for ſix Months, at 6 *per Cent. per Annum?*

To anſwer this, and other Sums of the ſame Kind, the general Rule is to make 12 Months the firſt Number in the *Rule of Three*, the Rate of *Intereſt* the ſecond, and the diſcounted Time the third.

If 12 Months give 6*l.* what 6 Months?
6

12|36
3 To be added to 100*l.* the firſt Number

Number in the next Work. Then ſay again, If 103 *l.* abate 3 *l.* what *l.* 487–12. Anſw. *l.* 14–4 *Diſcount.* *See the following Proof.*

After I find the Diſcount to be *l.* 14–4, I deduct it from the Sum firſt due, *viz.* *l.* 487–12, and the Remainder is the preſent Money to be paid down: And for the Proof of the Aſſertion in the firſt Rule, I take the Sum to be paid down, and calculate it at 9 *per Cent.* the Rate of Intereſt propoſed, and the Anſwer is *l.* 28–8, the Intereſt for a Year; the half of which for 6 Months, (the Time diſcounted) is *l.* 14–4, the *diſcounted Sum.* As by the following Work.

l. 487 12 firſt due.
14 04 diſcounted.

473 08 to pay down.
6 *per Cent.*

28|42 0
20

8|40

Intereſt for a Year *l.* 28 8

$\frac{1}{2}$ for 6 Months, *l.* 14 4 Proof.

From whence it is manifeſt, no one allows Intereſt for any more Money than he receives.

Example 2. What is the Diſcount of 275 *l.* 10 *s.* for 7 Months, at 5 *per Cent. per Annum?*

5 *l.* *per Cent.*

6 Months	$\frac{1}{2}$	2	10	0
1 Month	$\frac{1}{6}$	0	08	4
		l. 2	18	4

If *l.* 102–18–4 abate *l.* 2–18–4, what *l.* 275–10?
Anſw. *l.* 7–16—1.

First due *l.* 275–10
Diſcounted, 7–16—1

Paid down, 267–13–11
5 *per Ct.*

13|38–9–07
20

7|69
12

8|35
4
1|40

l. *s.* *d.*
Intereſt 13 7 8¼

6 Mo. ½ 6–13–10
1 Mo. ⅙ 1–02–03

Proof. 7–16–01

Example.

Bought Goods to the Value of *l.* 109–10, on 9 Months Diſcount, at 6 *per Cent. per Ann.* what muſt be paid down?

6*l.* *per Cent.*

6 Mo. ½ 3 00
3 Mo. ½ 1 10

4 10
100

If 104 10 abate *l.* 4 10, what 109 10?
Anſw. *l.* 4–14–3 4 14 3

Anſwer to be paid down, *l.* 104 15 9

Example

Example 4.

Sold Goods amounting to *l.* 217–12 on two 3 Months Diſcount, (that is, half at 3 Months, and the other half 3 Months after that) at 5 *per Cent. per Annum*, what muſt be paid down?

5 *l. per Cent.*
If 101–0–5 abate *l.* 1–5 Wt. 108 16
3 M. ¼ 1 5 Anſw. *l.* 1–06–10 Diſc.
100 0
101 5

l. 217–12 } 2 Parts.
108–16

Again,
If 102–10 Diſ. *l.* 2–10, Wt. *l.* 108–16
Anſw. *l.* 2 13 0 Diſc.
217 12 Val. ſold

5 *per Cent.*
6 M. ½ 2 10
100 00
102 10

l. 108 16 for 3 M.	1	06	10 Diſc.
108 16 for 6 M.	2	13	00 Diſc.
Total Diſcount,	3	19	10
Paid down,	*l.* 213	12	02 Anſw.

In the foregoing Example, I firſt divide the given Sum into two equal Parts, by taking the half of it; then for 3 Months, I take ¼ Part of the Rate, *viz.* 5 *per Cent.* and it makes 1 *l.* 5 *s.* Then I add that Facit to 100 *l.* and make the firſt *Stating*, ſaying, If *l.* 100–5 Diſcount *l.* 1–5, what *l.* 108–16? and the Anſwer is *l.* 1–6–10, for the firſt 3 Months Diſcount. Then for 6 Months I take the ½ of the Rate, and it makes *l.* 2–10: Then I ſay again, if *l.* 102–10 abate *l.* 2–10, what *l.* 108–16? And the Anſwer is *l.* 2–13 for 6 Months Diſcount. Then I add the two Diſcounts together, and ſubtract the Total from the *Sum* firſt due, and the Remainder is *l.* 213–12–2 to be paid down preſently. Which may be ſeen by the Work.

When the Payments are to be made at three ſeveral times, then divide the given *Sum* into three equal Parts, and work as before; and if at four Payments, then divide the Sum into four equal Parts, *&c.*

There is another and better Way, when the Rate is at 6 *per Cent.* Diſcount, which is thus:

Bring the given Sum into Pence, and then multiply thoſe by the time, which Product divide by 200, and the Time added together, and the Quotient will be the Anſwer in Pence, which reduce into Pounds, *&c.*

Example 5.

For a Trial, let us take the firſt Example in this Rule, *viz.*

```
What is the Diſcount of   l. 487 12
for 6 Months at 6 per Cent.     20
                          ---------
                              9752
                                12
                          ------------
        200                 117024 Pence.
          6                      6 Months Time.
   -------------            --------
Diviſor, 206          206)702144(3408 Pence.
   ---------                618
                           ------
   12)3408 Pence.           841
      --------              824
       28|4                ------
      --------              1744
   Diſco. l. 14 4           1648
      --------             ------
                            (96)
            l. 487 12 Firſt due.
                14 04
            ----------
       Anſ. l. 473 08 to pay down.
```

A third Way of Diſcount is to multiply 12 Months by 100 (which is only annexing two Cyphers to 12) and divide the Product by the Rate of Diſcount, and to that Quotient add the Time propoſed; which Sum reſerve for a Diviſor; then multiply the Sum to be diſcounted by the propoſed Time, and divide that Product by the above-mentioned Diviſor.

Example 6.

What is the Diſcount of *l.* 487-12, for 6 Months, at 6 *per Cent. per Annum*, (the firſt Example of this Rule?)

	12	Sum to be	*l.* 487-12
	100	diſcounted	6 Months.
Rate			
	6)1200		206)2925-12(14*l.*
			206
	200		
Time added	6		865
			824
Diviſor,	206		
			41
			20
Anſwer, *l.* 14 4*s.*			
to be diſcounted.			832(4*s.*
			824
			(8)

Example 7.

What preſent Money will diſcharge a Debt of 122*l.* 11*s.* 4*d.* due at 3 Months, diſcounting after the Rate of 6 *per Cent. per Annum?* Anſw. *l.* 120-15-1½.

After the laſt Method of Operation.

	l.	*s.*	*l.*	*s.*	*d.*	
Diviſor,	203)367	14(1		16	2½,	Diſcount.
		&c.				

Example 8.

What is the Diſcount of *l.* 275–10, for 7 Months, at 5 *per Cent. per Annum?* Anſw. *l.* 7–16–$1\frac{3}{4}$.

As before.

l. *s.* *l.* *s.* *d.*
Diviſor, 247)1928 10(7 16 $1\frac{3}{4}$ Diſcount.
&c.

For	2	*per Cent.* Diſcount.	600	with the Time added, is the Diviſor.
	3		400	
	4		300	
	5		240	
	6		200	
	7		171	
	8		150	
	9		133	
	10		120	

When the Diſcount of any Sum is at any of the Rates in the Table above, *viz.* from 2 to 10, then the oppoſite Numbers, with the Time of Diſcount added to them, will be proper Diviſors for your intended Purpoſe, and are found by dividing 1200 by the Rate of Diſcount; according to the Rule of the third Method of Diſcount.

If the Diſcount be 20, 30, or 40 *per Cent.* then cut off a Cypher from 600, 400, 300, &c. and add the Time to 60, 30, or 40, for the Diviſor, &c.

Example 9.

What is the Diſcount of *l.* 212–15, for 3 Months, at 40 *per Cent. per Annum?*

According to Rule, I add 3 (the Time) to 30, and it makes 33 for a Diviſor, &c.

212 – 15
3
33)638 05 *l.* 19–6–$9\frac{3}{4}\,\frac{3}{11}$, Anſwer.
&c.

CHAP.

CHAP. XVII.

EXCHANGE

IS the receiving of Money in one Country, or Nation, and paying it again in another, Value for Value, having Reſpect to the ſeveral Species of Coin, or Money of each Nation.

Exchange of Coins is like the Buſineſs of exchanging or bartering of Goods, and depends on a clear Underſtanding of the *Golden Rule*, to find what Sum of one Country's Money will be equal in Value to any propoſed Sum of another Country's Money: In order to which, it is very neceſſary to have at all times a true Account of the juſt Values of thoſe foreign Coins that are to be exchanged, as they are compared in Value to our *Engliſh*, at all times, as aboveſaid, becauſe the *Par* of Exchange differs almoſt every Day, from *London* to other Countries; that is, it riſes and falls, *&c*.

The Way of working *Exchange* is, either by the *Rule of Three*, or by *Practice*; and moſt commonly by the latter.

London exchanges with *Holland*, *Flanders*, &c. upon ſo many Shillings and Pence *Flemiſh* for the Pound Sterling; the *Par* being 33*s*. 4*d*. *Flemiſh*.

Dutch Money.	Sterl.	Val.
2 Groats, 1 *Stiver*	*s.*	*d.*
1 *Stiver*	0	1 $\frac{1}{5}$
6 *Stivers*, 1 Skilling *Flemiſh*	0	7 $\frac{1}{5}$
20 *Stivers*, 1 *Guilder*	2	0
6 *Guilders*, 1 Pound *Flemiſh* of 20*s*.	12	0
33*s*. 4*d*. *Flemiſh*, or 10 *Guilders*	20	0
A common *Dollar*	3	9
A Specie *Dollar*	5	0

Example

Example 1.

Remitted from *London* to *Amſterdam*, a Bill of *Exchange* of *l.* 285–10*s. Sterling*, the Exchange at 33*s.* 9*d. Flem. per Pound Sterl.* how many *Guilders Flemiſh* muſt the Bill be drawn for? Anſwer 2890 *Guilders*, 13 *Stivers.* Worked thus:

```
If 20s. Ster. give 33s. 9d. Flem. what l. 285 10 Sterling?
                    12                         20
                  ------                    ------
                   405                        5710
                                               405
                                            ------
                                             28550
                                            228400
                                          --------
                                      2|0)231255|0
                                          --------
           2 Groats 1 Stiver        2)115627–10
                                          --------
           20 Stivers 1 Guilder     2|0)5781|3
                                          --------
                            Anſwer, 2890 13
                                          --------
```

When you would know your Gain, or how much the Exchange is in your Favour, ſubtract the *Par* from the Courſe, or Price of the Exchange, and the Difference is the Gain *per Pound Flemiſh*, as here is but 5*d.* And ſo the contrary for Loſs, &c.

Example 2.

A Merchant in *Rotterdam* remits a Bill of *Exchange* of 7621 *Guilders*, 7 *Stivers*, to be paid in *London*, how much *Sterling* Money muſt the ſaid Bill be drawn for, the Exchange at 33*s.* 4*d. Flem. per Pound Sterling?*

Anſw. *l* 762 2 8

```
                                          Guild.  Stiv.
If 33s. 4d. Flem. gives 20s. Ster. what   7621    7
   12                    12                 20
  ----                  ----             --------
  400                   240               152427
                                               2 Groats.
                                         ----------
                                          304854
                                             240
                                         ----------
                                        12194160
                                        609708
                                      -------------
                                     4|00)731649|60
                                      -------------
                                       12)182912
                                       -----------
                                      2|0)1524|2—8
                                      ------------
                              Anſw. l. 762–02–08
                                      ------------
```

Sterling Money may be brought into *Flemiſh* Money by *Practice*, thus: Conſider how much the Rate of Exchange is above a Pound *Sterling*, which reduce to the Parts of a Pound, and take thoſe Parts of the *Sterling* Money, and add them to the *Sterling* Money, which Total multiply by 6, becauſe 6 *Guilders* make a Pound *Flemiſh*, and the Product will be the Anſwer.

Example.

The Anſwer to the *2d Example* of *Flemiſh* Money, reduced to *Sterling* Money, is l. 762 2 08

254 0 $10\frac{2}{3}$

254 0 $10\frac{2}{3}$

Here the Difference is 13s. 4d. or $\frac{2}{3}$ of a *l.* wherefore I take $\frac{2}{3}$ of *l.* 762–2–8, and add the Reſults to it, and it makes 7621 *Guilders*, 6 *Stivers*, 8 *Pennicks*, or 1 *Groat*; as by the *Rule of Three*.

1270 4 $05\frac{1}{3}$

6

Guil. 7621 6 08

Or *Flemiſh* Money may be brought into *Sterling* Money, by bringing the Courſe or Rate of Exchange into Pence for a Diviſor; and the *Flemiſh* Money into Pence likewiſe for a Dividend; and the Quotient will be the Anſwer in *Sterling* Money.

Example 3.

For how much *Sterling* Money muſt a Bill be drawn for Goods bought in *Holland*, amounting to 11715 *Guild.* 12 *Stivers*, the Exchange at 34*s.* 8*d. Flem. per Pound Sterling.*

s. d. *Guild.*
34 8 11715 12 *Stiv.*
12 40 Groats.

416 Diviſ.)468624(*l.* 1126–10*s. Sterl.*
(208) Remainder.
20

4160(10*s. Sterl.*
4160

London exchanges with *France* upon the *French* Crown, whoſe *Par* is 54*d.* that is, to pay ſo many Pence, or Shillings and Pence, for the *French* Crown.

French Money.			Val. Sterl.	
			s.	*d.*
12 *Deniers*, 1 *Soulz*,	———	———	0	$0\frac{3}{4}\frac{1}{5}$
20 *Soulz*, 1 *Livre*,	———	———	1	6
3 *Livres*, 1 *Crown*,	———	———	4	6

Example 4.

If I draw a Bill *per* Exchange *l.* 210–17–10 *Sterling*, to be paid in *Paris*, the Exchange at 57*d.* $\frac{1}{8}$, for how many Crowns muſt I draw the Bill?

Anſwer 886 *Fr. Cr.* 0 *Liv.* 1 *Soulz.*

```
   d.  Fr.  Cr.             l.   s.  d.
If 57⅛ —— 1 —— what 210  17  10
    8       3 Liv.       20
  ———     ———          ———
  457       3          4217
           20 Sol.        12
          ———         ———
           60          50614
                           8 Eights.
                      ————
                      404912
                           60 Second Num
                      ———————
              457)24294720(53161 Soulz.
2 Fr. Crowns 60 Soulz 6|0)5316|1
              ——————————————— Li. Soulz.
                      Fr. Cr. 886.00 1 Answ.
```

Example 5.

Admit a Bill drawn in *Lyons*, and payable in *London* for 1510 Crowns, 2 *Livres*, 10 *Soulz*, how much *Engliſh* Money comes it to, the Exchange at 55*d.* $\frac{1}{8}$?

Anſwer *l.* 347 0 $4\frac{5}{8}$.

Again, ſuppoſe a Merchant in *London* buys Goods for another in *Calais*, to the Value of *l.* 102–4 *Sterling*, for which he is to draw a Bill on him in *Calais*; for how many Crowns muſt the Bill be drawn? Anſw. 438 *Fr. Cr.*

```
  s.     Fr. C.     l.  s.
If 4⅔ ——— 1 ——— 102 4
   3                20
  ——              ———
  14               2044
                      3
                 ————
                7)6132
                ————
                2)876
                ————
          Anſw. 438 Crowns.
```

Here the firſt and third Numbers are brought into Thirds, and then I divide by 7 and 2, the *Ratio's* of 14, &c.

London exchanges with *Spain* upon the Pieces $\frac{8}{8}$ at 54*d. Sterling.*

Spanish Money.	Sterl. s.	Val. d.
1 *Mervid*	0	0 $\frac{1}{3}$ $\frac{12}{31}$
34 *Mervids*, 1 *Rial* (formerly 6*d.*)	0	4 $\frac{3}{4}$
11 *Rials* Plate, 1 Ducat	4	4
10 *Rials* Plate, 1 *Pce.* $\frac{8}{8}$	4	0

Example 6. How many Pcs. $\frac{8}{8}$ at 48*d.* $\frac{1}{4}$, will anſwer a Bill of *l.* 344-11-8$\frac{1}{2}$ *Sterling?* Anſw. 1714.

Example 7. 24690 *Rials* Plate, how many *Pcs.* $\frac{8}{8}$, and Pounds *Sterling*, the *Exchange* at 4*s.* 6*d. per Pce.* $\frac{8}{8}$?

Anſwer { 2469 *Pcs.* $\frac{8}{8}$
l. 555-10-6 *Sterling.*

London exchanges with *Portugal* upon the *Millrea* of about 5*s.* 6*d.* to 5*s.* 7*d.*

Portugal Money.	Sterl. s.	Val. d.
12$\frac{1}{2}$ *Reas*	0	1
1000 *Reas*, 1 *Millrea*	6	8
1 *Feſton*	1	3

Example 8 How many *Millreas* muſt a Bill be drawn for, to pay *l.* 125-11-11-$\frac{3}{4}$ *Sterling*, the Exchange at 5*s.* 6*d.* $\frac{1}{4}$ *per Millrea?* Anſw. 455 *Millreas.*

If 5*s.* 6*d.* $\frac{1}{4}$ —— 1 —— what *l.* 125-11-11$\frac{3}{4}$?
Anſwer 455.

Example 9. How many Pounds *Sterling*, &c. muſt a Bill be drawn for, to anſwer 500 *Millreas*, the Exchange at 5*s.* 5*d.* $\frac{5}{8}$ *per Millrea?* Anſwer *l.* 136-14-4-$\frac{1}{2}$.

Example 10. How many Pounds *Sterling*, &c. muſt a Bill be drawn for, to anſwer 600 *Millreas*, 550 *Reas*, at 5*s.* 7*d. per Millrea?* Anſwer *l.* 167-13-0-$\frac{32}{43}$.

London exchanges with *Venice* upon the *Ducat* of 52*d.* and with *Leghorn* upon the *Dollar*, or *Pcs.* of $\frac{8}{8}$ of 54*d.*

Italian Money.

	Sterl. Val.	
1 *Livre* at *Leghorn*	*s.* 0	9
1 *Crown* current at *Florence*	5	3
1 *Ducat de Banco* at *Venice*	4	4
1 St. *Mark* at ditto	2	10
1 *Palermo* Florin	2	6

When the Compariſon is made between *Foreign Coins* of one Country and another, ſuch Queſtions may be anſwered by the *Single Rule of Three Inverſe.*

Example 11.

How many *Spaniſh Ducats*, at 4*s.* 4*d.* muſt be drawn for 700 *Rixdollars*, at 5*s.* 6*d.*

If 700 —— 5*s.* 6*d.* —— 4*s.* 4*d.*
12 12
66 52
700

52)46200(888$\frac{24}{52}$ Anſwer.
416
460
416
440
416
(24)

CHAP.

CHAP. XVIII.

PROFIT and *LOSS.*

Example 1.

IF I buy 220 Yards of Broad Cloth, at 8*s.* 6*d. per* Yard, and ſell it again at 10*s.* 4*d. per* Yard, what do I gain by the whole?

Firſt find the Difference by *Subtraction*, between the Price bought, and the Price ſold for; then by *Practice* caſt up the Number of Yards by that Difference, as underneath.

s.	*d.*	
10	4	Sold for
8	6	Bought for
1	10	Difference.

		220 Yards at 1*s.* 10*d.*		Or thus:		
6*d.*	$\frac{1}{2}$	110		220		
4*d.*	$\frac{1}{3}$	73-4				
				22		
		40|3-4	Subtract $\frac{1}{120}$	1	16	8
		Anſw. *l.* 20-3-4 Total Gain.		20	03	4

Example 2. If a Draper buy 750 Ells of *Holland* for *l.* 81-5, how muſt it be ſold *per* Ell, to gain *l.* 21-17-6 in the whole? Anſwer 2*s.* 9*d.*

Here the intended Gain muſt be added to the Prime Coſt, which makes *l.* 103-2-6. Then ſay,

If 750 Ells coſt *l* 103-2-6, what 1 Ell? and the Anſwer will be 2*s.* 9*d. per* Ell. And for ſo much muſt he ſell it *per* Ell, to gain *l.* 21-17-6 in the whole.

And for Proof, ſee by *Practice* what 750 Ells come to, at 2*s.* 9*d.* and you will find it amount to *l.* 103-2-6.

Example 3. Admit a Merchant to buy Goods to the Value of 425 *l.* and offers them again for *l.* 15 *per Cent.* Profit, what come they to? *State it thus:*

If *l.* 100 gain 115, what *l.* 425

425
115
———
2125
425
425
———
488|75
20
———
15|00
Anſw. 488-15

Or thus:
425 at 15 *per Cent.*
4 Hundred under 15 *per Cent.*
———
60
25 is $\frac{1}{4}$ of 100 *l.* 3 15, or $\frac{1}{4}$ of 15 *l.*
———
63 15 Profit.
Add 425-00 Prime Coſt.

Anſ. *l.* 488-15, what they muſt be ſold for, as before.

Example 4. If I buy 500 Pair of Silk Hoſe, at 8*s.* 6*d.* *per* Pair, how much muſt I ſell them for *per* Pair, to gain 30 *per Cent.*

Firſt ſee what they come to at 8*s.* 6*d.* *per* Pair; thus:

500 Pair, at 8*s.* 6*d.*
8
———
4000
6*d.* $\frac{1}{2}$ 250
———
425|0
———
Anſwer *l.* 212-10

Then ſee what *l.* 212–10 comes to at 30 *per Cent.*

10 *per Cent.*

21|25 00
20

l. 21 5 ; 10 *per Cent.*

5|00 3

30 *per Ct.* Profit, *l.* 63–15 | Anſwer
Prime Coſt, 212–10 | add

l. 276–05

Then ſay, If 500 Pair coſt *l.* 276 5, what 1 Pair?
Anſwer 11*s.* *d.* $\frac{1}{2}\frac{2}{5}$.

Example 5. An Half-penny in the Shilling, what is that *per Cent?*

l. 100
20

$\frac{1}{2}$)2000 Shillings.

12)1000

8|3–4

Anſw. *l.* 4–3–4 *per Cent.*

Or thus:

4)100

6)25

l. 4–3–4

A Penny in a Shilling, is as much again; 2*d.* four times as much; 3*d.* ſix times as much, &*c.* So you may multiply it either by 2, 4, or 6, to know how much you gain *per Cent.* at thoſe Rates in a Shilling, &*c.* Or, conſider what Part of a Shilling your Profit is, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, or $\frac{1}{5}$, &*c.* and take that Part of 100*l.* and the Quotient will be what ſuch Profit in a Shilling makes *per Cent.*

Example 6. As ſuppoſe 2*d.* in the Shilling is your Profit, Two-pence we know is the $\frac{1}{6}$ of a Shilling, wherefore I take 6th Part of 100*l.* thus:

6)100

6)100*l.*

Anſw. 16–13–4 *per Cent.*

In the laſt Example, $\frac{1}{2}$*d.* in the Shillings was *l.* 4·3·4 *per Cent.* where if you multiply by four, the Halfpence in 2*d.* you'll find the ſame Anſwer *l.* 16–13–4 Proof. And ſo the contrary.

Again, admit I gain 3*d.* $\frac{1}{2}$, or 5*d.* in the Shilling, what is that *per Cent ?*

Here, in regard that 3*d.* $\frac{1}{2}$ is $\frac{7}{24}$ and 5*d.* $\frac{5}{12}$ of a Shilling, I multiply 100 by the Numerator, and divide by the Denominator, according to the 4th Table at the Beginning of the Rule of *Practice*, thus:

3*d.* $\frac{1}{2}$ in the 1*s.* 100 7 Halfpence   100 5 Pence in the 1*s.* *i.e.* $\frac{5}{12}$.

4)700   12)500

6)175   *l.* 41 $\frac{8}{12}$ or $\frac{2}{3}$, *i. e.* 13*s.* 4*d.*

Anſwer 9 $\frac{1}{6}$, or 3*s.* 4*d.*

As whatever Part of a Shilling is your Profit, the ſame *per Cent.* will be your Profit alſo; ſo on the contrary whatever Part of 100*l.* is your Profit, the ſame Part of a Shilling will be your Profit likewiſe. As, ſuppoſe your Gain be 25 *per Cent.* which is the 4th Part of 100*l.* ſo your Gain in a Shilling will be 3*d.* at the Rate of 25 *per Cent.* for as 25 is the 4th Part of 100*l.* ſo is 3*d.* of 12*d.*

Example 7. If I propoſe to get in any Goods 20*l.* *per Cent.* Profit, what is that in a Shilling? 20*l.* is the 5th Part of *l.* 100, wherefore take the 5th Part of a Shilling for the Profit; thus:

5)12*d.*

2 $\frac{1}{4}$ $\frac{3}{5}$.

Example 8. Suppoſe I have Goods to the Value of *l.* 415–12–6, that come to a bad Market, and know that they impair by lying, I therefore am obliged to ſell them at 12 *per Cent.* Loſs, what come they to?

Here the Loſs muſt be ſubtracted from 100 *l.* and the Remainder is the middle Number.

From 100	If 100——88 *l.* what	415	12	6
take 12	Anſwer	365	15	0
88	Loſt in all, *l.*	49	17	4

Or thus: See what *l.* 415–12–6, comes to at 12 *per Cent.* and ſubtract that from the Coſt of the Goods.

l. 415–12–6
12
l. 49|87–10
20
s. 17|50
12
d. 6|00

From *l.*	415	12	6
Take	49	17	6
Anſwer *l.*	365	15	0

If Deal Boards be bought at 18*d. per Piece*, and ſold again at 21*d.* what is that *per Cent.* Profit?
Anſwer *l.* 16 13 4, thus:
If 18*d.*——gain——3*d.*——what——100 *l.*
If I buy Cinnamon for 6*s.* 7*d. per* lb. and ſell it again for 5*s.* 9*d.* what is loſt *per Cent?* Anſw. *l.* 12–13–1$\frac{77}{79}$.
If 6*s.* 7*d.*——loſe——10*d.*——what——100 *l.*

There are two or three other Rules, which might be introduced, ſuch as *Alligation*, *Medial*, and *Alternate*, and the *Rule of Falſe*; but they being more for Amuſement than real Uſe, I ſhall omit them; and in the next Place, ſay ſomething of *Fractions*.

CHAP. XIX.

Of FRACTIONS, Vulgar *and* Decimal.

NUMERATION.

I. A *Fraction* is Part of a whole Number, and ariſes from *Diviſion*, (as was ſaid before) and hath theſe two Parts, viz. *Numerator* and *Denominator*, which have a ſhort Line between them, and ſet thus:

Remainder 5 Numerator.
———
Diviſor 8 Denominator.

The Numerator expreſſes the Number of Parts, and the Denominator giveth to thoſe Parts their Names. As ſuppoſe 277 *l.* be divided among 8 Men, the Quotient will be 34*l.* the Share to each Man; and there will be a Remainder of 5, which muſt be ſet over the *Diviſor* 8, thus $\frac{5}{8}$, and ſignifies, that if a *l.* or 20*s.* were divided into 8 Parts, each Man muſt have 5 of thoſe 8 Parts (or $\frac{1}{2}$ Crowns) more to his Share, as was before hinted.

II. A Vulgar Fraction is either *Simple* or *Compound.*

III. A Simple Vulgar Fraction is that which hath only one Numerator, and one Denominator, and is either Proper or Improper.

IV. A Proper Fraction hath always its Denominator greater than its Numerator, as $\frac{3}{4}$. $\frac{7}{8}$, $\frac{12}{20}$, *&c.*

V. An Improper Fraction hath its Numerator always greater than its Denominator, as $\frac{5}{3}$, $\frac{9}{4}$, $\frac{30}{12}$, *&c.*

VI. Compound Fractions conſiſt of divers Numerators and Denominators, and are known by this Particle [*of*] being between them; and are therefore ſometimes called

Fractions of Fractions, as $\frac{2}{3}$ of $\frac{5}{6}$ of $\frac{7}{8}$; that is, two thirds of five ſixths of ſeven eighths

VII. Fractions are of two Kinds, *Vulgar* and *Decimal.*

What *Vulgar* Fractions are, hath been declared already. A *Decimal* Fraction is an artificial Way of expreſſing Vulgar Fractions by ſetting down the Numerators only, the Denominators being underſtood, but not expreſſed, and is always an Unit, with as many Cyphers annexed as there are Places in the Numerator; and therefore muſt be either 10, 100, 1000, 10000, 100000, &c.

VIII. A Decimal Fraction is diſtinguiſhed from a whole Number by a Comma, or Point prefixed thus, ,5 and ſignifies 5 tenths of an Integer: So the following Fractions are exhibited vulgarly and decimally, *viz.*

7	Tenths,	$\frac{7}{10}$	,7
35	Hundredths,	$\frac{35}{100}$	,35
327	Thouſandths,	$\frac{327}{1000}$	,327
64	Ten Thouſandths,	$\frac{64}{10000}$	,0064
108	Hundred Thouſ.	$\frac{108}{1000000}$	,00108

In Decimals $\frac{1}{4}$ of any thing is ,25; $\frac{1}{2}$ of *ditto*, is ,5, $\frac{3}{4}$ is ,75.

IX. As whole Numbers increaſe by a Ten-fold Proportion from the Unit's Place to the Left-hand, ſo Decimals decreaſe by the ſame Proportion, from Unity to the Right-hand, as may be ſeen by the following Table.

Integers.

Integers.						1	Decimals.					
Millions	*C. of Thouſands*	*X's of Thouſands*	*Thouſandths*	*Hundreds*	*Tens*		*Tenth Parts*	*Hundredths*	*Thouſandths*	*X. Thouſandths*	*C. Thouſandths*	*Millions of Parts*
7	6	5	4	3	2	1	2	3	4	5	6	7
						Units.						
Seventh Place	*Sixth Place*	*Fifth Place*	*Fourth Place*	*Third Place*	*Second Place*		*Primes*	*Seconds*	*Thirds*	*Fourths*	*Fifths*	*Sixths*
Integers, or whole increaſing Numbers.							Decimals, or Fractional decreaſing Numbers.					

Here the Figure 2 in the Integers ſignifies 2 Tens, or twice 10 Units; but the Figure 2 in the Decimals ſignifies but ,2 or 2 Tenths of Unity, or one.

X. The Order of Places in whole Numbers is from the Right-hand to the Left; but in Decimals it is from the Left-hand to the Right. So in the Decimal ,456, the Figure 4 ſtands in the firſt Place, and is 4 Primes or 4 Tenths of an Integer; and 5, the ſecond Figure is 5 Seconds, or Five Hundred Parts of an Integer, *&c.*

XI. Cyphers before Integers, and after Decimals, are of no Value; but after Integers, and before Decimals, they have their Value: For, in Integers they increaſe, and in Decimals they decreaſe the Value of the Figure joined with them. For 4, and 04, and 004, in whole Numbers, is ſtill but four; but in Decimals, 4 by having a Point prefixed, thus, ,4 is decreaſed from 4 Integers to $\frac{4}{10}$ of an Integer, and ,04 to 4 Hundredth Parts of an Integer, *&c.* Again, in whole Numbers, ,30 is Thirty, and 300 is Three Hundred; but in Decimals, ,30 or ,300 is ſtill but $\frac{3}{10}$ of an Integer.

Reduction of Fractions, is to bring a Fraction into a common, or into the leaſt Denomination; thereby preparing Fractions to be added, ſubtracted, multiplied, or divided.

XII. To reduce Fractions that have unequal Denominators, to Fractions of one common Denominator.

The Rule.

Multiply each Numerator into all the Denominators, (except its own) and take the reſpective Products for new Numerators. *2dly,* Multiply all the Denominators continually; ſo ſhall that Product be a new Denominator, common to all the Numerators found before.

Example.

Reduce $\frac{2}{5}$, $\frac{3}{7}$, and $\frac{8}{9}$ of a Pound, to a common Denominator.

The firſt 2 the 2d, 3 the third, 8 Denominator.

7	5	7	5
14	15	56	7
9	9	5	35
			9
$\frac{2}{5}\left\{\frac{126}{315}\right.$	$\frac{3}{7}\left\{\frac{135}{315}\right.$	$\frac{8}{9}\left\{\frac{280}{315}\right.$	315 Com. Denominator.

Here I firſt multiply 2 by 7, and the Product is 14, which I multiply by 9, and the Reſult is 126, for the firſt Numerator. Again, I multiply 3 by 5, and the Product is 15, which multiplied by 9, makes 135, for the ſecond Numerator: Then I multiply 8 by 7, and the Product is 56, which multiplied by 5, produces 280, for the laſt Numerator. Laſt of all, I multiply 5, 7, and 9, the ſeveral Denominators together, and their Product is 315 for the common Denominator to all the Fractions. *See the Work above.*

Reduce $\frac{1}{2}$, and $\frac{5}{8}$ —— $\frac{8}{10}$ $\frac{10}{16}$ }
Reduce $\frac{7}{11}$, and $\frac{11}{12}$ —— $\frac{84}{132}$ —— $\frac{121}{132}$ } Facit.
Reduce $\frac{3}{7}$, and $\frac{5}{19}$ —— $\frac{57}{133}$ $\frac{35}{133}$ }

To prove your Work, divide the new Numerator by the Numerator of the Fraction ; and alſo divide the common Denominator by the Denominator of the Fraction, and if both Quotients are alike, the Work is right.

XIII. *Abbreviation*, or how to bring a Fraction into its loweſt Denomination.

The Rule.

Divide both Numerator and Denominator by ſuch a Number as will leave no Remainder in either of them. When the Numerator and Denominator are both even Numbers, they may be reduced by halving, or dividing them by 2.

Example. Reduce $\frac{12}{28}$ into its loweſt Terms, or Denomination.

$$2\left\{\frac{12}{28}\right. \Bigg| \frac{6}{14} \Bigg| \frac{3}{7} \text{ Anſwer } \frac{3}{7}$$

Here I ſay, the $\frac{1}{2}$ of 12 is 6, and the $\frac{1}{2}$ of 28 is 14, and then again the $\frac{1}{2}$ of 6 is 3, and the $\frac{1}{2}$ of 14 is 7 : So is the Fraction $\frac{12}{28}$ reduced to $\frac{3}{7}$ its loweſt Terms ; and $\frac{3}{7}$ of any thing is equal in Value to $\frac{12}{28}$. Or if you had divided the ſaid Fraction by 4, it had been reduced at once ; for the 4's in 12, 3 times, and the 4's in 28, 7 times, or $\frac{3}{7}$, as before.

When you can no longer halve the Fraction, then divide it either by 3, 4, 5, 6, 7, *&c.* if any of them ſo divide as to leave no Remainder. And after you have divided by a greater, you may after divide by a leſſer Number, to reduce the Fraction lower ſtill.

Example. Reduce $\frac{84}{168}$ into its loweſt Denomination.

$$\frac{1}{2}\left\{\begin{array}{c|c|c|c|c|c|c|c|c} & by & & by & & by & & by & \\ 84 & 2 & 42 & 2 & 21 & 7 & 3 & 3 & 1 \\ \hline 168 & 2 & 84 & 2 & 42 & 7 & 6 & 3 & 2 \end{array}\right\}\text{Anſw. }\frac{1}{2}.$$

Here is firſt taken the $\frac{1}{2}$, then take the $\frac{1}{2}$ again, this divide by 7, and then by 3, which brings it to $\frac{1}{2}$, the loweſt Terms.

(3.) If the Fraction, *viz.* Numerator and Denominator end each with a Figure of 5, or a Cypher, or the one with a 5, and the other with a Cypher, divide each of them by 5, and the Quotient will be a new Numerator and Denominator.

Example. Reduce $\frac{55}{80}$, and $\frac{75}{95}$, to their loweſt Terms.

$$5\left\{\begin{array}{c|c} 55 & 11 \\ \hline 80 & 16 \end{array}\right\}\text{Anſwer }\frac{11}{16}.$$

$$5\left\{\begin{array}{c|c} 75 & 15 \\ \hline 95 & 19 \end{array}\right\}\text{Anſwer }\frac{15}{19}.$$

(4.) There is a Way of reducing a Fraction into its loweſt Name by a common Meaſure, which is thus:

Divide the Denominator by the Numerator, and if any thing yet remains, divide the foregoing or laſt Diviſor by it; and ſo you muſt do till nothing remains, and then the laſt Diviſor is the common Meaſure required, which will divide both Numerator and Denominator, without leaving any Remainder; and ſo reduce the Fraction into its loweſt Terms at once. But if your laſt Diviſor be 1, the Fraction is in its loweſt Name already.

Example. Reduce $\frac{128}{144}$ into its loweſt Terms by a common Meaſure.

128)144(1
128
———
16)128(8
128
———
(0)

16)128(8
128
———
(0)
16)144(9
144
———
(0)

Here I firſt divide 144 by 128, and there remains 16; by which I divide the laſt Diviſor 128, and there remains (0), wherefore 16 the laſt Diviſor, is the common Meaſure ſought for, and divides both Numerator and Denominator, without leaving any Remainder, (as may be ſeen in the Work above) and reduces the Fraction into $\frac{8}{9}$, its loweſt Terms.

But I prefer the other Way, in common Buſineſs, before this latter; for the Time ſpent in finding the common Meaſure, is longer than that ſpent in reducing the Fraction the other Way.

It is very expeditious in many Caſes to work Fractionally, *viz.* to multiply by the Numerator, and divide by the Denominator of a Fraction into its loweſt Terms.

Example. What comes a hundred Weight to at 6*d.* $\frac{1}{2}$ *per* Pound? Conſider that $\frac{112}{240}$ in its loweſt Terms, is $\frac{7}{15}$, wherefore multiply 6*d.* $\frac{1}{2}$ by 7, and divide by 15, thus:

6*d.* $\frac{1}{2}$
7
———
3)45 $\frac{1}{2}$ Rem. $\frac{2}{5}$, or 8*d.*
———
5)15
———
Anſ. *l.* 3–0–8 *per Cent.*

Or, if you double the Price of a Pound, and multiply by 7 and by 8, as follows, you have the Anſwer.

6d. $\frac{1}{2}$

s. 1–1

7–7
8

Anſw. 3–0–8

Or contrariwiſe, you have the Price of a Pound thus:

7)60*s.* 8*d.*

8) 8 8
2) 1 1

6d. $\frac{1}{2}$ Anſwer.

Any Goods ſold by the Long Hundred, in Tale, or 120 to the Hundred, as Linen, Fiſh, Deals, *&c.* being $\frac{120}{240}$ multiply the Price of one by 6, and divide that Product by 12, thus:

Example. Fiſh at 3 *d.* $\frac{1}{2}$ a Piece.
6

12)21

l. 1 $\frac{9}{12}$ or 15*s.*

When Things are ſold by the 1000, as Bricks, Tiles, Hoops, *&c.* ſtanding thus, $\frac{1000}{240}$, then multiply the Price of one by 50, and divide by 12, it gives the Price of 1000.

Example. Oranges at 2*d.* a-piece
50

12)100

Anſw. *l.* 8 $\frac{4}{12}$ or 6*s.* 8*d.* *per* Thouſand.
12

50)100 0 0 contrary.

2*d.* a-piece.

Or any thing ſold by the 1000 may be done by multiplying the Quantity by the Price, always cutting off 3 Figures or Cyphers, toward the Right-hand.

Example. Bought 4796 plain Tiles, at 17*s.* 6*d.* *per* M.
17

6*d.* is $\frac{1}{2}$ of 1*s.* 81532
2398

83|930
12

4|311| 160

Anſw. *l.* 4-3-11 $\frac{160}{1000}$

This is an eaſy and plain Method.

Again, ſold 45874 Grey Stock Bricks, at 18*s.* *per* M.
18

82|5,732
12

l. 41-5-8|784
4

3,136

Anſw. *l.* 41-5-8$\frac{3}{4}$ $\frac{139}{1000}$.

I multiply by 18, and it produces 825*s.* and 732 cut off for 1000, and that multiplied by 12, gives 8*d.* &*c.*

A Fraction is ſeldom abbreviated in Decimals.

XIV. Valuation. The Value of a Fraction is found by multiplying the Integer by the Numerator of the Fraction, and dividing that Product by the Denominator. Or contrary-wiſe, by dividing by the Denominator, and multiplying by the Numerator.

Example. What is the $\frac{2}{3}$ of a *l. Sterling?*

Contra, 3)20 — 20 *s.* the Integer.
2 Numerator.
6 8
2 — 3)40
s. 13 4 Anſwer, *s.* 13 4 Anſwer.

What is the $\frac{4}{5}$ of a Pound?

20 *s.*
4
5)80
16

What is $\frac{12}{28}$ of 20 *s.*
3 its loweſt Terms.
7)60
s. 8$\frac{4}{7}$ Anſwer.

What is $\frac{3}{7}$ of a Hundred Weight?

Contra, 7)112 — 112 *lb.* the Integer.
3
16
3 — 7)336
48 *lb.* Anſwer. 48 *lb.* Anſwer.

What is	$\frac{6}{7}$ of a *l.*?	Anſw. 17*s.* 1*d.* $\frac{1}{2}$ $\frac{6}{7}$
	$\frac{7}{8}$ of a Shilling?	Anſw. 10*d.* $\frac{1}{2}$
	$\frac{6}{8}$ of a *l.* 100 *Sterling*?	Anſw. 75 *l.*
	$\frac{7}{16}$ of a Tun of Wine?	Anſw. 176 $\frac{4}{16}$ Gal.
	$\frac{7}{11}$ of a *C.* Weight?	Anſw. 71 *l.* $\frac{3}{11}$
	$\frac{4}{16}$ of a Gallon?	Anſw. 3 $\frac{2}{16}$ Pints.
	$\frac{12}{16}$ of a Tun Weight?	Anſw. 15 *C.*
	$\frac{2}{3}$ of a Foot?	Anſw. 8 Inches.
	$\frac{3}{4}$ of a *lb.* Weight?	Anſw. 12 Oz.

Mixt Numbers.

What is $\frac{4}{6}$ of 12*s.* 6*d.*? *Contra.* 6)12*s.* 6*d.*

4 2 1

6)50 0 4

8 4 8 4

If a Yard of Cloth be worth 8*s.* 10*d.* what $\frac{3}{4}$?

3

4)26 6

6 7$\frac{1}{2}$ Anſwer.

If a Ship be worth *l.* 946 12 6, what $\frac{4}{32}$ Parts?

4

8)3786 10 0

4)473 06 3

l. 118 06 6$\frac{3}{4}$

XV. If you would know what Part of a Pound any Number of Shillings and Pence is, or what Part of a

Tun any Quantity of *C. qrs.* and *lb.* is, bring them into the loweſt Name mentioned; and alſo bring the Integer into the ſame Name, and ſet it for a Denominator, and then bring the Fraction into its loweſt Terms.

Example. What Part of a Pound is 12*s.* 6*d.*

20*s.* the Integer 12
12
240
Numerator, 15|0|5
Denominator, 24|0|8 } Anſ.

When there are Cyphers in a Vulgar Fraction at the End, they may be cut off, and you work as if there were none, as in the foregoing Example.

What Part of *C.* Weight is 71 *lb.* $\frac{3}{11}$?

11 112 *lb.* the Integer.
11
784
1232
1232

Anſwer $\frac{784}{1232}$ or $\frac{7}{11}$, in its loweſt Terms.

XVI. *To reduce Vulgar Fractions into Decimals.* Reduction of Decimals is either from common Fractions, or into ſome known Denomination. Therefore to reduce any Vulgar Fraction into a Decimal, to the Numerator of the Fraction, annex 1, 2, 3, 4, 5, or more Cyphers at pleaſure, and then divide by the Denominator.

Example. Reduce $\frac{3}{4}$ of a *l.* into a Decimal Fraction.

4)300
,75 Facit, or 15*s.*

Here to the Numerator 3, I annex two Cyphers, and divide by the Denominator, and it quotes ,75; which is equal in Value to $\frac{3}{4}$ of any Thing.

If I had annexed 3 Cyphers to the Numerator, the Quotient would then have been ,750 which is ſtill but ,75; for Cyphers on the Right-hand do not increaſe or diminiſh a Decimal, as was ſaid before. Again, Reduce $\frac{2}{3}$ of a *l.* into a Decimal.

3)2000

,666 Facit, or 13*ſ*. 4*d*.

Reduce 6*ſ*. 8*d*. into a Decimal.

12

8|0|2

24|0|6

6)2000

,333 Facit, or 6*ſ*. 8*d*.

XVII. Valuation of Decimals. In Money you muſt account for every Prime, or Unit, in the firſt Place, 2 Shillings; and for every 5 in the ſecond Place, 1 Shilling; and what is above 5, account ſo many Tens; and the Figure in the third Place, ſo many Units; which Tens and Units are Farthings; but if they exceed $\frac{25}{48}$, there muſt be one Farthing abated.

Example. What is the Value of ,75*l.* the firſt of the foregoing Examples? Anſw. 15*ſ*. For the 7 in the firſt Place, I reckon 14*ſ*. and for five in the ſecond I account 1*ſ*. which put together, make 15*ſ*. the Value of the Decimal Fraction.

Again. Another *Example* is ,333: For the firſt 3 I reckon 6*ſ*. and for the other two I account 33 Farthings, and abating 1, (becauſe above 25) there reſts 32, or 8*d*.

What is the Value of ,9749? The firſt Figure 9, being doubled, makes 18*ſ*. and the Figure (7) in the ſecond being above 5, I reckon 1*ſ*. which put to the 18, makes 19*ſ*. and the Exceſs of 7 above 5 being 2, or 2 Tens, makes the next Figure 4 to be 24, which is 24 Farthings, or 6 Pence. So the Decimal Fraction ,9749 is in Value 19*ſ*. 6*d*. *A deciſive Rule.* As often above 13 makes leſs by 1, or above 39 makes leſs by 2.

When you would know the Value of a Decimal in Weight, Meaſure, &c. (as the Value of Decimals of Money may be alſo found) multiply the Decimal by the Parts of the next inferior Denomination, which make an Integer in the ſame Denomination with the given Decimal; and cut off ſo many Figures towards the Left-hand, as there are Places in the Decimal, and the Figures on the other Side of the Stroke towards the Left-hand, are the Value of the Decimal, in the next inferior Denomination. And if there be any thing remaining, multiply it by the Parts of the next lower Denomination, *&c.* And ſo the Fraction may be reduced as you pleaſe.

Example. What is the Value of this Decimal of a *C.* Weight, *viz.* ,875? Anſwer $\frac{3}{4}$ 14 *lb.*

4 *qrs.* 1 *C.*

3|500
28 *lb.* 1 *qr.*

4000
1000

14|000

Here three Places are cut off towards the Left-hand, becauſe there are ſo many in the Decimal. And thus may the Value of any Decimal be found, whether of Money, Weight, Meaſure, Time, *&c.*

XIX. To reduce compound Fractions into ſimple ones of the ſame Value.

Rule. Multiply all the Numerators continually for a Numerator, and all the Denominators for a Denominator.

Ex. Reduce $\frac{3}{4}$ of $\frac{5}{6}$ of $\frac{7}{8}$ of a *l.* into a ſimple Fraction.

3 4
5 6

15 24
7 8

Numerator 105 192 Denominator.
Denominat. 192 Facit.

Reduce $\frac{9}{10}$ of $\frac{11}{12}$ of $\frac{13}{14}$ of a Tun $\frac{1287}{2680}$.

XX. To reduce whole or mixt Numbers into improper Fractions. *Rule.*

(1.) If a whole Number is to be reduced into an improper Fraction, ſet the propoſed whole Number for the Numerator, and an Unit, or 1, the Denominator: Thus 8 Integers may be reduced into $\frac{8}{1}$; or elſe you may aſſign a Denominator to the Integer, and multiply it by the aſſigned Denominator, and the Product will be the Numerator to the ſaid Denominator.

Example. Admit 9 Integers are to be reduced into an improper Fraction whoſe Denominator ſhall be 5: Here I multiply 9 by 5, the propoſed Denominator, and the Product is 45, for a Numerator to the ſaid Denominator 5; ſo is the improper Fraction $\frac{45}{5}$ equal to 9 Integers.

Reduce 24 into an improper Fraction, whoſe Denominator ſhall be 8.

$$\begin{array}{r} 24 \\ 8 \\ \hline \end{array}$$

$$\left.\frac{192}{8}\right\} \text{Facit.}$$

(2) If a mixt Number is to be reduced into an improper Fraction. *Rule.*

Multiply the whole Number by the Denominator of the Fraction, and take in the Numerator.

Example. Reduce $12\frac{3}{4}$ into an improper Fraction.

$$\begin{array}{r} 4 \\ \hline \end{array}$$

$$\left.\frac{51}{4}\right\} \text{Facit, equal to } 12\tfrac{3}{4}.$$

Again, Reduce *l.* $14\frac{7}{8}$, or *l.* 14-17-6 into an improper Fraction.

$$\begin{array}{r} 8 \\ \hline \end{array}$$

$$\left.\frac{119}{8}\right\} \text{Facit.}$$

XXI. To reduce improper Fractions into whole or mixt Numbers. *Rule.*

Divide the Numerator by the Denominator, and if it be a mixt Number, what was taken in will remain.

Example. Reduce $\frac{119}{8}$ (the foregoing Sum) into its equivalent mixt Number.

8)119

$14\frac{7}{8}$ Anſw. Or *l.* 14–17–6.

Here the Anſwer is 14 Integers, and $\frac{7}{8}$ of an Integer.

Reduce $\frac{51}{4}$ Yards into a mixt Number.

4)51

$12\frac{3}{4}$ Yards Anſwer.

Reduce $\frac{45}{5}$ into its equivalent whole Number.

5)45

9 Anſw. 9 Integers.

XXII. To reduce Fractions from one Denominator to another.

(1.) This is either a ſmaller Fraction to be brought into the Denomination of a greater. Or,

(2.) A greater into that of a ſmaller.

Examples. Reduce 3*d.* $\frac{1}{2}$ into the Fraction of a *l. Sterling*. Make of it a compound Fraction, thus. Reduce the mixt Number into an improper Fraction, thus, 3*d.* $\frac{1}{2}$, then ſay, what is $\frac{7}{2}$ of $\frac{1}{12}$ of $\frac{1}{20}$ of a *l.*

Anſw. $\frac{7}{480}$. Or you may ſay, what is $\frac{7}{2}$ of $\frac{1}{240}$?

Anſw. $\frac{7}{480}$.

Here it being reduced from a Compound Fraction to a ſimple one, according to the 19th Rule of this Chapter, it produces $\frac{7}{480}$, the proper Fraction of a *l.* belonging to 3*d.* $\frac{1}{2}$.

Reduce $\frac{3}{4}$ of a Penny to the proper Fraction of a *l.*

Say $\frac{3}{4}$ of $\frac{1}{12}$ of $\frac{1}{20}$, or $\frac{3}{4}$ of $\frac{1}{240}$. Anſwer $\frac{3}{960}$.

By the ſame Method may be reduced either Weight or Meaſure, *&c.*

When the Fraction is to be brought from a greater to a leſſer Name, then multiply the Numerator by the Parts in the ſeveral Denominations, betwixt that and it, that you would reduce it to.

As ſuppoſe the Reverſe of the laſt Queſtion was aſk'd, *viz.*

What Part of a Penny is the $\frac{3}{960}$ of a *l.*

$$\begin{array}{r} 3 \\ 20 \\ \hline 60 \\ 12 \\ \hline 720 \\ 4 \\ \hline 2880 \end{array} \quad \left.\frac{2880}{3}\right\} \text{Anſwer.} \qquad \begin{array}{r} 3)2880 \\ \hline 960 \end{array}\ \text{Proof.}$$

Again reduce $\frac{3}{4}$ of a *l.* to the Fraction of a Penny.

$$\begin{array}{r} 3 \\ 20 \\ \hline 60 \\ 12 \\ \hline \end{array}$$

$$\left.\frac{720}{3}\right\} \text{Facit.}$$

Addition of Fractions.

If the Fractions to be added have a common Denominator, then add all the Numerators together for a Numerator, and place it over the common Denominator.

Example. What is the Sum of $\frac{2}{5}$, $\frac{3}{5}$, and $\frac{4}{5}$ of a *l.*?

$$\begin{array}{c}2\\3\\4\\\hline 9\\\hline 5\end{array}$$

This being an improper Fraction, I reduce it to a mixt Number, and it makes 1 $\frac{4}{5}$, or *l.* 1–16.

Or thus :		Decimally.				Demonſtration.		
$\frac{2}{5}$	,4	$\frac{2}{5}$	,40	$\frac{2}{5}$		0	8	0
$\frac{3}{5}$	,6	$\frac{3}{5}$	,60	$\frac{3}{5}$	is	0	12	0
$\frac{4}{6}$	,8	$\frac{4}{5}$	,80	$\frac{4}{5}$		0	16	0
l. 1,8			1,80, or *l.* 1–16			*l.* 1	16	0 *Proof.*

Here the Vulgar Fraction being reduced to Decimals, according to the 16th Rule of this Chapter, I caſt up the reſpective Decimals, as I do whole Numbers, and the Anſwer is 1 Integer, and ,8 of an Integer; that is *l.* 1–16 the 8 Primes being accounted 16*s.* according to the Rule of Valuation of Decimals, given in the 17th Rule of this Chapter.

In *Addition of Decimals*, we obſerve the ſame Method as in whole Numbers, only in ſetting down, Regard muſt be had that the fractional Parts ſtand one under the other, *viz.* Primes (or Tenths) under Primes; Seconds, under Seconds; Thirds, under Thirds, &c. And if mixt Numbers are to be added, then the Fractions to ſtand as before directed, and the whole Numbers to ſtand as in whole Numbers; that is, Units under Units; Tens under Tens, &c. without any Regard to the Fractions annexed.

Examples.

Fractions.		Mixt Numbers.
,45	,4	124,97
,5	,574	7,065
,095	,0067	27,5
,225	,56	65,007
1,270	1,5407	224,542

Note, *That ſo many fractional Places as are found in the greateſt among thoſe Numbers that are added, ſo many Places muſt be pointed off from the Total, towards the Right-hand, for Decimal Parts, and the other Figures towards the Left-hand, are whole Numbers, as in the foregoing Example may be obſerved.*

Again, Add 4 Feet 3 Inches, 6 Feet 9 Inches, and 8 Feet 6 Inches together.

Feet.	Pts.
4 ,	25
6 ,	75
8 ,	50
19 ,	50 Anſw. 19 Feet ½.

More Examples.

Integer Parts.
41 , 426
16 , 04
36 , 274
22 , 8
116 , 540

Decimal Parts of a	*l.*	*s.*	*d.*
,333		6	8
,25		5	0
,75	or	15	0
,003		0	0¾
,3		6	0
1 , 636 *l.*	1	12	8¾

SUB-

SUBTRACTION.

I. As in *Addition*, if the Fractions have unequal Denominators, they muſt be reduced to a common Denominator before *Subtraction* can be made. Then ſubtract one Numerator from the other, and place the Difference over the common Denominator.

From $\frac{7}{8}$ of a *l.* take $\frac{2}{5}$

$$\begin{array}{ccc} 7 & 2 & 8 \\ 3 & 8 & 3 \\ \hline 21 & 16 & 24 \\ 16 & & \\ \hline \end{array} \qquad \frac{21}{24}\ \frac{16}{24}\ \text{Diff. } \frac{5}{24}.$$

Decimally

$$\begin{array}{r} ,875 \\ ,666 \\ \hline ,209 \end{array}$$

Anſw. 4*s*. 2*d*.

$$\left.\frac{5}{24}\right\}$$ Anſwer 4*s*. 2*d*.

From $\frac{7}{8}$ take $\frac{3}{8}$. Anſw. $\frac{4}{8}$ or $\frac{1}{2}$.

Decimally.

$$\begin{array}{r} ,875 \\ ,375 \\ \hline \end{array}$$

Anſw. ,500

From $\frac{11}{16}$ *l.* take $\frac{1}{2}$.

$$\begin{array}{c} 16 \\ \hline 8 \\ \hline \end{array} \qquad \begin{array}{c} 11 \\ 8 \\ \hline \end{array}$$

$$\left.\frac{3}{16}\right\}$$ Anſw. 3*s*. 9*d*.

Subtraction of Decimals is the ſame as in whole Numbers, obſerving to keep the ſame Order or placing the Numbers as directed in *Addition of Decimals*.

II. To ſubtract a Fraction from a whole Number.

Rule. Subtract the Numerator of the Fraction from the Denominator, and the Remainder place over the given Denominator, for a Numerator; and take a Unit

from

from the whole Number of what you borrowed, and the Remainder place before the Fraction found; which mixt Number ſhall be the Difference ſought.

Example. Subtract $\frac{6}{8}$ from 25, Facit $24\frac{2}{8}$.

Here 6 from 8 and there reſts 2, which I put over the Denominator 8, thus $\frac{2}{8}$; then 1 from 25 and there reſt 24, which I place before the Fraction $\frac{2}{8}$, thus $24\frac{2}{8}$; which is the Difference ſought.

From 12 Ells take $\frac{5}{8}$, Facit $11\frac{3}{8}$.

Decimally. From ,6875 take ,5 of a *l.*

```
 ,6875
 ,5000
 -----
 ,1875 Anſw. or 3s 9d.
```

Here the Vacancy is ſupplied with Cyphers, or they might have been omitted, and only ſuppoſed to have been there; and if at any time there ſhould be a Vacancy in the upper Number, it may be ſupplied with Cyphers; or, as aboveſaid, accounted there.

Example. Subtract this Decimal of *l.* *viz.* ,75 from this whole Number, 25 *l.*

```
 25,00
   ,75
 -----
 24,25 or l. 24-5.
```

Here the Defect, (tho' not of Places, yet of Number) is ſupplied by annexing Cyphers to the whole Number; for otherwiſe you could not ſubtract ,75 from 25.

III. To ſubtract a mixt Number from a whole Number.

Rule. From the Denominator of the Fraction, (ſubtract the Numerator, and ſet the Remainder over the Denominator, and then pay 1 to the whole Number, and ſubtract it from the Integer, and the Remainder is the true Difference ſought.

Example. From 12*s.* take $5\frac{3}{8}$

$5\frac{3}{8}$

Facit $6\frac{5}{8}$ or 6*s.* 7*d.* $\frac{1}{2}$

Decimally.

12*s.* . . .

5 ,375

Anſw. 6 ,625 or 6*s.* 7*d.* $\frac{1}{2}$

Again. From 24 Ells take 19 Ells $\frac{3}{5}$.

Decimally.

24

19,6

4,4 Anſw.

$19\frac{3}{5}$

$4\frac{2}{5}$

From 16*C.* take *C.* $13\frac{7}{16}$

$13\frac{7}{16}$

$2\frac{9}{16}$ Anſw.

Decimally.

16 . . . .

13,4375

2,5625

IV. To ſubtract a mixt Number from a mixt Number.

Rule. (1.) Take the leſſer Numerator from the greater.

Example. From $37\frac{7}{8}$ take $23\frac{5}{8}$.

Decimally.

37 ,875

23 ,625

14 ,250

$23\frac{5}{8}$

$14\frac{2}{8}$ Anſw.

(2.) When a greater Fraction is to be taken from a leſſer, then take the Numerator of the greater Fraction from its Denominator, and put the Remainder to the Numerator of the leſſer, which is borrowing an Integer, &c.

Example. Take C. $24\frac{12}{16}$ from $35\frac{7}{16}$

C. $35\frac{7}{16}$

$24\frac{12}{16}$

Facit, $10\frac{11}{16}$

From *Gal.* $78\frac{3}{4}$ take *Gal.* $29\frac{2}{3}$. Reduce to a common Denominator.

The Fractions $\frac{9}{12}$ and $\frac{8}{12}$ then from $78\frac{9}{12}$
take $28\frac{8}{12}$

Facit $50\frac{1}{12}$

MULTIPLICATION.

Rule I. Firſt multiply the Numerators together for a new Numerator; and ſecondly, multiply the Denominators together for a new Denominator.

Example. Multiply *l.* $\frac{7}{8}$ by $\frac{3}{4}$ of a *l.*

$$\left.\begin{array}{ll}\text{Here 7 times 3 is 21, the Numerator,} & 21 \\ & \overline{} \\ \text{And 8 times 4 is 32, the Denominator,} & 32\end{array}\right\}\begin{array}{l}\text{Facit,}\\ \text{or}\\ 13\text{–}1\frac{1}{2}\end{array}$$

Multiplication in whole Numbers increaſes the Product, but in Fractions it decreaſes it, that is, makes it leſs than either of the two Numbers alone.

The Reaſon is, becauſe 1 multiplied by 1 is but 1; therefore that which is leſs than one, being multiplied by that which is leſs than 1, muſt needs be leſſened by *Multiplication.*

In *Multiplication of Decimals*, we proceed as in whole Numbers, only when you have done your Multiplication, you muſt point off from the Product as many Figures or Cyphers, towards the Right-hand, as there are fractional Places in both Multiplicand and Multiplier; and what Figures remain toward the Left-hand, beſide what are cut off, are Integers: But if there are not ſo many Places, ſuch Defect muſt be ſupplied by Cyphers towards the Left-hand.

Example. Multiply the foregoing Sum, *viz.* $\frac{7}{8}$ by $\frac{3}{4}$ Decimally.

$\frac{1}{8}$,875
$\frac{3}{4}$,75

4375
6125

,65625 Anſwer 13*s*. 1*d*.

Here are 5 decimal Places in both the Fractions, therefore all the Product is pointed off for decimal Parts.

II. When a compound Fraction is to be multiplied by a ſimple one, reduce it according to the 19th Rule in *Reduction of Fractions*, and work as before.

Example. Multiply $\frac{3}{8}$ of a *l*. by $\frac{5}{8}$ of $\frac{3}{4}$ of a *l*. The compound Fraction being reduced, makes $\frac{15}{32}$, which multiplied by $\frac{3}{8}$, produces $\frac{45}{256}$, or 3*s*. 6*d*. $\frac{3}{16}$.

When a Fraction or mixt Number, is to be multiplied by a whole Number, conſtitute a Unit for a Denominator to the whole Number, and then it becomes an improper Fraction ; then work as before.

Example. Multiply 24 by $\frac{2}{3}$ (that is $\frac{24}{1}$ by $\frac{2}{3}$) Facit $\frac{48}{3}$.
Multiply *l*. 12 by $\frac{3}{8}$ of a *l*.
$\frac{12}{1}$ *per* $\frac{3}{8}$ Anſwer $\frac{36}{8}$ or 4*l*. 10*s*.
Decimally.

,375
12

Facit, 4,500 or 4*l*. 10*s*.

III. When a mixt Number is to be multiplied by a Fraction, reduce the mixt Number into an improper Fraction, and work as before.

Example. 16$\frac{1}{2}$ by $\frac{4}{12}$
2

33

2 *per* $\frac{4}{12}$, Facit $\frac{132}{24}$.
Multiply 7$\frac{1}{4}$ by $\frac{3}{4}$ of a Yard. Facit, $\frac{87}{16}$, or 5$\frac{7}{16}$ Yards.

Decimally.

7,25
,75

3625
5075

5,4375

IV. To multiply mixt Numbers by mixt Numbers, that is, a whole Number and a Fraction by a whole Number and a Fraction.

Rule. Reduce the given Numbers into improper Fractions, and work as before.

Example. Multiply $120\frac{1}{4}$ by $48\frac{1}{2}$ 4
4 2 2

481 481 97 8 Denom.
97
4 2

3367
4329

Denominator, 8)46657

Anſwer $5832\frac{1}{8}$

Or thus: Firſt multiply the whole Numbers together as 120 by 48; and to the Product add $\frac{1}{4}$ of 48, and $\frac{1}{2}$ of 120.

Example.

Decimally.
120,25
48,5

60125
96200
48100

5832,125

$120\frac{1}{4}$ long.
$48\frac{1}{2}$ broad.

960
480
60 the $\frac{1}{2}$ of 120
12 the $\frac{1}{4}$ of 48

$5832\frac{1}{8}$ Anſw.

Then multiply the Fractions by themſelves, ſaying, once 1 is 1, and twice 4 is 8; which produces the $\frac{1}{8}$; as in the *Example.*

And thus, by either of theſe Ways, having the Length and Breadth of any ſuperficial Quantity, its Contents may be found.

Multiply 2*s.* $\frac{1}{3}$ by 3*s.* $\frac{2}{4}$
3 $\frac{2}{4}$

6
1
1

Facit. $8\frac{2}{12}$, or 8*s.* 2*d.*

Or thus (3)
2 4
3 6

7 0
1 2

8 2

Or 2*s.* 4*d.* by 3*s.* 6*d.*
(2)

Or thus: *s.* *d.*
2 4
3 6

6 0
1 0
1 2

Anſw. 8 2

Decimally.
2,333
3,5

11665
6999

8,1655 Anſ. 8*s.* 2*d.*

The ſecond of theſe Ways is called *Croſs Multiplication*, or *Duo-Decimals*, by which Shillings and Pence may be multiplied by Shillings and Pence; or Feet and Inches by Feet and Inches, carrying the ſame from one Denomination to the next; for as 12 Pence make a Shilling, ſo does ſo many Inches a Foot. In the Work I firſt multiply the whole Numbers by themſelves, ſaying, 3 times 2 is 6; then croſs-ways, I ſay, 6 times 2 is 12*d.* or 1*s.* and 3 times 4 is 12*d.* or 1*s.* Then the Pence by the Pence, ſaying 6 times 4 is 24, which I divide by 12, ſaying the 12's in 24, twice, *&c.*

But the third and beſt Way is wrought *practically*, and the laſt *decimally*; each Method producing the ſame Anſwer; as may be ſeen in each Work.

	l.	*s.*	*d.*
Multiply	3	15	9
By	*l.*	4, 7, 6	
	15	3	0
2*s.* 6*d.* $\frac{1}{8}$		9	5$\frac{1}{2}$
ditto		9	5$\frac{1}{2}$
ditto		9	5$\frac{1}{2}$
Facit *l.*	16	11	4$\frac{1}{2}$

l.	*s.*	*d.*	
84	13	6	
l. 17,3			
338	14	0	*p.* 4 & 4
		4	
1354	16	0	
84	13	6	
8	9	4	$\frac{2}{10}$
4	4	8	$\frac{1}{10}$
l. 1452	3	6	$\frac{3}{10}$

By the ſame Method may be multiplied Weight or Meaſure.

DIVISION.

I. If the Fractions are ſingle, and have a common Denominator, divide the one Numerator by the other, and the Quotient is the Anſwer.

Examples.

Divide $\frac{6}{8}$ by $\frac{3}{8}$, Facit 2.

Divide $\frac{9}{12}$ by $\frac{3}{12}$, Facit 3.

Divide $\frac{27}{32}$ by $\frac{3}{32}$, Facit 9.

II. *Diviſion of Decimals* is worked juſt as it is in whole Numbers; only when the Work is over, you muſt point off as many Places from the Quotient, for Decimal Parts, as the Dividend has more than the Diviſor; that is there muſt be as many Decimal Places in the Diviſor and Quotient as there are in the Dividend; but if not, the Defect muſt be ſupplied by Cyphers being annexed to the Left-hand of the Quotient, and is juſt the Converſe of Multiplication of Decimals.

III. When the Diviſor conſiſts of more Places than the Dividend, a competent Number of Cyphers muſt be annexed to the Dividend, before you can make a Diviſion.

Example. Let us divide the firſt Sum on the other Side *Decimally* ; when the Fractions are reduced to Decimals, they make ,75 to be divided by ,375, wherefore I join two Cyphers to the Dividend ,75, thus, ,7500, and then divide as in whole Numbers.

,375),7500(2,0 or 2
750
(0)

IV. When in Vulgar Fractions, the Dividend and Diviſor are both ſimple Fractions, then multiply the Numerator of the Dividend by the Denominator of the Diviſor, for a Numerator; and alſo multiply the Denominator of the Dividend into the Numerator of the Diviſor, for a Denominator, and the Work is done.

Example.

What is the Quotient of $\frac{4}{5}$ of a *l.* divide by $\frac{3}{4}$ of a *l.*

$\frac{3}{4})\frac{4}{5}(\frac{16}{15}$ Anſwer.
Divide $\frac{12}{14}$ by $\frac{9}{12}$, Facit $\frac{144}{120}$, or $\frac{7}{8}$.

Or you may reduce the Fractions to a common Denominator, and then divide the new Numerator of the Dividend by the new Numerator of the Diviſor.

Example.

Divide $\frac{12}{14}$ by $\frac{9}{12}$, $\frac{144}{168}$, $\frac{126}{168}$,

126)144(1 $\frac{18}{126}$ or $\frac{2}{14}$ Anſwer.

V. To divide a whole Number by a Fraction, multiply the Integer by the Denominator of the Fraction, and divide by the Numerator.

Example.

Divide 15 Yards by $\frac{3}{4}$ 15
Decimally. 4
,75)15,00(20 or ——
150. 3)60(20 Anſwer.
——
(0)

VI. To divide a Fraction by a whole Number, let the Numerator ſtand as Numerator, and multiply the Integer into the Denominator for a Denominator.

Example.

Divide $\frac{2}{5}$ of an Ell by 9 Ells, Facit $\frac{2}{45}$.
Decimally.
9),400(
——
,044 Anſwer.

VII. To divide a mixt Number by a whole Number, reduce the mixt Number into an improper Fraction, and by its Denominator multiply the Integer ſor a Diviſor.

Example.

Divide $5\frac{3}{4}$ Yards by 4 Yards.
4 4
23 16)23($1\frac{7}{16}$, Anſwer.
— 16
4 7
— Decimally.
4)5,750
Facit, 1,437

VIII. To divide a mixt Number by a Fraction, reduce the mixt Number into an improper Fraction, and then multiply the Numerator of the improper Fraction, by the Denominator of the Fraction, and the Denominator of the improper Fraction by the Numerator.

Example.

Divide *l.* 12 $\frac{2}{3}$ by $\frac{5}{8}$
3 38
8
38
3 — 15)304($20\frac{4}{15}$, Anſwer.
5 3
— Decimally.
15 ,625)12,666666(20,266 Anſwer.

IX. To divide a whole Number by a mixt Number, reduce the mixt and whole Numbers into improper Fractions, and work as before.

Example.

Divide *l.* 48 by *l.* 12 $\frac{1}{2}$

48
2

25)96($3\frac{21}{25}$ Anſwer.
75

21

2
1
25
2

Decimally
12,5)48,000(3,84 Anſwer.

X. To divide a mixt Number by a mixt Number, bring them into improper Fractions, and work as before.

Example.

Divide $8\frac{3}{4}$ Yards by $5\frac{1}{2}$ Yards.

4
35
4

2
11
2

44)70($1\frac{26}{44}$
44
26

Decimally.
5,5)8,750(1,59
5,5
325
275
500
495
(5)

The RULE *of* THREE.

Here, as in whole Numbers, the firſt and third Numbers muſt be of one Denomination ; and as is the Stating, ſo is the Operation the ſame, *viz.* ſecond and third Numbers are multiplied together, and that Product divided by the firſt ; according to the foregoing Rules of working Fractions.

Example.

If $\frac{3}{4}$ Yard of Cloth coſt $\frac{4}{5}$ of a *l.* what $\frac{5}{6}$ Yard.

$$\begin{array}{ccc} 4 & \qquad & 5 \\ \hline 20 & & 30 \\ \hline \end{array}$$

$\frac{3}{4})30(\frac{80}{90}$ Anſw. $\frac{8}{9}$ or 17*s.* 9*d.* $\frac{1}{3}$.

When the Numerator and Denominator both terminate with a Cypher, or Cyphers, they may be cut off, and the Fractions ſtill retain the ſame Value.

There is another and better Way of working the Queſtion, when it is ſtated, which is thus:

Multiply the Numerators of the firſt, into the Denominators of the ſecond and third Fractions, for a new Denominator; and then the Denominator of the firſt Fraction into the Numerators of the ſecond and third, for a new Numerator; which, if an improper Fraction, may be reduced into a whole or mixt Number.

Example.

If $\frac{3}{4}$ Yard coſt $\frac{4}{5}$*l.* what $\frac{5}{6}$ Yard. Anſw. $\frac{80}{90}$, or $\frac{8}{9}$

$$\begin{array}{ccc} 4 & \qquad & 3 \\ \hline 16 & & 15 \\ 5 & & 6 \\ \hline 80 & & 90 \end{array}$$

Facit $\frac{80}{90}$, or $\frac{8}{9}$ as before.

The foregoing Queſtion wrought Decimally.

Yards *l.* *Yards.*
If ,75 coſt ,8 what ,833
,8

,75),66640(,888 Anſw. or 17*s.* 9*d.*

lb. *s.* *lb.*

If $2\frac{3}{4}$ Tobacco coſt $3\frac{1}{2}$, what $242\frac{1}{4}$?

4	2	4
11	7	969
4	2	4
7	11	
28	22	
969	4	
252	88 Denominator.	
168		
252		
27132		

$$\text{Numerator. }\left.\frac{27132}{88}\right\}\text{ Anſwer.}$$

88)27132(30[8

$15–8–3\frac{3}{4}$ Facit.

Decimally.

lb. *s.* *lb.*

If 2,75———3,5———242,25

3,5

121125

72675

2,75)847,875(308,3

Anſw. *l.* $15–8–3\frac{3}{4}$

Here the Operation is juſt as it is in whole Numbers.

Before I conclude, I ſhall work ſome Examples in Intereſt by Decimals, by which may be ſeen, that the Decimal Way, in ſome Caſes, has the Advantage of the Vulgar.

Simple Intereſt.

Example 1. What is the Amount of a Year's Intereſt of 826*l.* 13*s.* 9*d.* at 5 *per Cent.*

826,687
,05

Anſw. 41,33435 Or *l.* 41 6 8¼ according to the Rule of valuing a Decimal in Reduction of Fractions.

Here the 13*s.* 9*d.* is reduced to the Decimal, ,687, and annexed to the whole Number, 826*l.* with the Decimal Characteriſtic between them; which multiplied by ,05 the Decimal of the Rate, *viz.* 5 *per Cent.* which is found by annexing Cyphers to the Rate, and dividing by 100, thus:

per Cent.
100)5000(,05 according to the Way of valuing the Quotient in Diviſion of Decimals, *viz.* the Quotient muſt have as many Decimal Places as the Dividend exceeds the Diviſor. After the ſame Manner the Decimal for 4 *per Cent.* is found to be ,04, and of 6, ,06, &c.

Example.

What is the Year's Intereſt of 348*l.* 13*s.* 2*d.* at 6 *per Cent. per Annum.*

l. 348,658
,06

20,91948 Anſwer *l.* 20–18–4½.

Here there are as many Decimal Places ſeparated to the Right-hand, as there are Decimal Places in both Multiplicand and Multiplier, according to the Rule of Multiplication in Decimals (as in the foregoing Example alſo) and the Decimal Parts are found to be 18*s.* 4*d.* ½, according to the Rule of valuing a Decimal of Money, &c.

Example 3.

What's the Intereſt of
l. 326——at——4 *per Cent.*
,04

13,04 Anſwer 13–00–9½.

When the Simple Intereſt of any Sum is required for 2, 3, 4, 5 Years, &c. it's only to find the Intereſt for 1 Year, and then to multiply that Intereſt by 2, 3, 4, or 5, &c.

Example

Example 4.

What's the Intereſt of 324*l.* 10*s.* for 4 Years, at 4 *per Cent. per Annum?*

l.
324,5
,04

12,980 Anſwer for 1 Year *l.* 12 19 7¼
Years 4

Anſwer *l.* 51 18 5

If the Intereſt required be for Parts of a Year, *i. e.* Months, *&c.* take ſuch Parts of the Year's Intereſt; as 6 Months is the ½, 3 Months the ¼, and 4 Months the ⅓, *&c.*

To find the Intereſt of any Sum of Money, for any Number of Days, at any Rate of Intereſt.

Rule. Multiply the Principal by the Rate of Intereſt, and then that Product by the Number of Days, which reſerve for a Dividend, (which divide by 365,00 the common Diviſor for all Rates, the Days of the Year multiplied by 100) anſwers the Queſtion.

Example 5.

What's the Intereſt of 240*l.* for 96 Days, at 5 *per Cent. per Annum?*
5

1200
96

365,00,1152,00 Anſw. *l.* 3 3 1¾.

Likewiſe there may be found Decimal Numbers correſpondent to the Duty or Cuſtom on Tobacco, *Holland* Cloth, *viz.*

	240 *lb.*			
		Old Subſidy	,95	
1*d. per* lb	1 lb.	*New Subſidy*	,92625	
5 *per Cent. cut off*	,05	*Addit. Duty*	,87875	
		⅓ *New Subſidy*	,29485625	
Old Subſidy	,25	*Impoſt*	2,484	
2½ *per Cent. off*	,02375			
New Subſidy	,92625	*Duty of* 240*l.*		5,53385625
5 *per Cent. more off the Old*, viz. 7*d.* ½.	,0475			
Additional Duty	,87875			
½ *of the New Subſidy with* 4 *per Cent. off.*	,30875 ,01389375			
	,29485625			
	3*d. per* lb.		3,0	
	10 *per Cent. off*		,3	
			2,7	
	8 *per Cent. off*		,216	
		Impoſt	2,484	

And ſo for *Holland* Cloth.

So ſome of the Rules of Practice may be work'd by Decimals, but ſhorter by Vulgar Fractions.

F I N I S.

Thomas Woodrige Boot